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OBSERVATIONS ON THE CHEMISTRY OF BLOOD AND URINE IN TOXÆMIAS OF PREGNANCY.¹

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Melbourne.]

THE following investigations were carried out for the Obstetrical Research Committee, Edward Wilson (*The Argus*) Fund.

In the Women's Hospital during the year 1920-1925 there were 214 deaths on the maternity side; 74 deaths or 35% were due to toxæmias of pregnancy.

The Registrar-General's Report of the United Kingdom places the causes of death in the order: (i) Sepsis, (ii) toxæmia, (iii) haemorrhage, (iv) accidents of childbirth and miscellaneous.

The object of the investigation was to ascertain whether the chemistry of the blood and urine would assist in the elucidation of any of the problems which arise in connexion with the toxæmias of pregnancy.

Much work has already been done on the chemistry of blood and urine in pregnancy and our object was to compare the results obtained with those observed elsewhere, to determine whether any great differences existed. We also tried to obtain as complete a picture as possible of the chemical condition of the blood and urine of pregnant women with albumin in the urine, hoping thereby to be able to classify them into definite groups in which the chemical picture would indicate the clinical condition.

Over a period of nineteen months samples of blood and urine from 304 patients were examined, necessitating the performance of 3,290 tests, 63% of which were quantitative.

The number of patients on whom individual tests were performed is tabulated in Table I.

TABLE I.

Body Fluid.	Test.	Number of Patients.
Blood . . .	Fouchet	281
	Van den Bergh	280
	Non-protein nitrogen	164
	Blood urea	325
	Uric acid	156
	Creatinine	158
	Lævulose	71
	Cholesterol	6
	Urea concentration	256
	Total nitrogen	225
Urine . . .	Urea nitrogen	226
	Ammonia nitrogen	226
	Diastatic index	211
	Diacetic acid	221
	Diacetic acid and acetone	221
	Diacetic acid with acetone (quantitative)	53
	Urobilin	210

¹ Read at a meeting of the Gynaecological and Obstetrical Society, Melbourne, on June 28, 1928.

The methods used in the various tests were as follows:

Urea concentration: McLean's method.

Diastatic index: de Wesselow and Wyatt.

Blood urea: McLean's method.

Non-protein nitrogen: Micro-Kjeldahl on protein-free filtrate as prepared by Folin.

Uric acid: Benedict's method.

Creatinine: Folin.

Diacetic acid: Gerhardt's method.

Diacetic acid and acetone: Rothera's test.

Urobilin: Bogomolov's test.

Lævulose test: As McLean's method for estimating glucose tolerance.

Total nitrogen in urine: Kjeldahl.

Ammonia and urea in urine: McLean's method.

TABULATION OF BIOCHEMICAL RESULTS.

There appears no reason to elaborate complex clinical types. The conditions have been grouped as follows:

Normal,

Vomiting,

Pyelitis,

Albuminuria,

Albuminuria of labour,

Pre-eclampsia (albumin "E" in the graphs), Chronic nephritis; nephritic types (albumin "N"),

Slight albuminuria (albumin "S"),

Eclampsia,

Hepatic types; accidental haemorrhage.

Since the publication in detail of the large number of figures obtained would burden the paper with tables, it was thought better to express the results in graphical form, first as a comparison between the percentages of abnormal conditions in the different groups of toxæmias for each particular test and secondly as a comparison between the percentages of abnormal conditions in the different tests for a particular toxæmia.

Three cases have been chosen from each group in the above classification, with the object of illustrating the most characteristic abnormality of each group.

The figures in Group I show that in a small percentage of normal women there is a tendency for a reaction to be obtained to the Fouchet and Van den Bergh tests.

In Group II the vomiting group is characterized by strongly positive reactions to the Fouchet and Van den Bergh tests and the presence of urobilin, indicating liver inefficiency and also by a high blood urea content. In the urine of nearly all these patients diacetic acid and acetone were present.

Again in Group III the patients with pyelitis show a tendency towards positive Fouchet and Van den Bergh reactions.

In Groups VI and VII the nephritics manifest the characteristic low urea concentration and high blood urea content.

Group IX, the patients in eclamptic group, have definite renal damage or hepatic damage, in many both kidneys and liver being involved.

TABLE II.—DETAILS OF CHEMICAL AND OTHER DATA OF THREE PATIENTS IN EACH GROUP.

24 Hours' Specimen of Urine.

24 Hours' Specimen of Urine.												Milligrammes per 100 c.c. Blood.											
Type.	Vol. c.c.m.	Ammōnia, Grammes, Grams,	% NH ₃ -N TN	Diaست. Index.	Direct Acetone.	Urobilin.	Blood Urea N. Non-P.N.	Ure Add.	Creatinine.	Urin. N.	Non-P.N.	BUN.	Urin. N.	Ure Add.	Blood Urea N. Non-P.N.	Ure Add.	Creatinine.	Urin. N.	Non-P.N.				
Group I.—Normal ..	600 8.19	0.04 0.6	86 0.6	3.3 10	— +	—	3.0 ..	++	+ + + + i	28 21	13.2 9.9	9.3 5.2	1.7 1.3	11.1 13.9	47 38								
	1,410 13.28	0.66 0.66	8.11 77	4 6.6	—	++	2.2 ..	—	+ + + + i	19	23	8.9 4.8	1.1 1.1	12.1 12.1	39 ..								
Group II.—Vomiting ..	600 17.37	0.33 0.33	10.94 77	6 6.6	—	++	3.3 120	++	+ + + + + + i	50	..	23.5				
	250 1.32	0.35 0.35	0.92 73	20	++	484 mg/1 148 mg/1	—	3.8 100	++	44	37	21	8	1.6 1.6	12.5 12.5	54 ..							
Group III.—Pyelitis ..	900 12.84	0.18 0.18	7.28 80	2 10	—	—	2.4 120	++	+ + + + + + i	33	162	15.5 ..	1.2				
	1,600 12.58	0.42 0.42	8.59 69	4 3.3	+	100 mg/1	—	2.3 ..	++	28	54	13.2 7	1.5 1.5	38 38	24 ..								
Group IV.—Albuminuria of Labour ..	1,010 27.37	0.14 0.53	10.94 20.00	71 2	3.3 ..	—	2.8 130	—	+ + + + + + i	16	..	7.5				
	1,620 4.20	0.45 0.45	4.24 4.24	9 6.6	—	+	2.8 138	—	+ + + + + + i	42	37	18.8 7.1	1.5 1.8			
Group V.—Pre-eclampsia ..	1,225 10.66	0.20 0.20	6.80 80	2 3.3	—	—	2.3 170	—	+ + + + + + i	52	36	24.4 6.0	1.3 1.3	9.1 9.1	68 ..								
	960 18.62	0.24 0.24	10.9 12.55	1.3 3.3	—	—	3.4 110	—	+ + + + + + i	39	27	18.5 16.5	6.2 6.2	1.5 1.5	1.5 1.5	68 ..							
Group VI.—Albuminuria (Nephritic Type) ..	1,134 6.30	0.14 0.39	4.89 5.65	79 6	2 ..	+	0.9 190	—	+ + + + + + i	65	62	30.6 7.6	1.9 1.9			
	826 8.26	0.14 0.39	5.65 6.65	72 6	2 ..	—	0.8 165	—	+ + + + + + i	55	40	25.9 32.4			
Group VII.—Nephritis ..	720 8.53	0.43 0.18	5.11 6.17	49 7	3.3 ..	—	1.3 140	—	+ + + + + + i	49	23				
	1,400 3.27	0.46 0.21	12.66 2.88	76 6	6.6 ..	—	3.6 136	—	+ + + + + + i	115				
Group VIII.—Slight Albuminuria ..	925 11.88	0.30 0.30	7.61 7.61	73 2	2 ..	+	1.9 ..	—	+ + + + + + i	96	54	45.1 8.2	2.1 2.1	5.5 5.5	84 ..								
	1,700 30.3	0.46 0.21	12.66 2.88	76 6	6.6 ..	—	3.3 160	+	+ + + + + + i	34	62	16 37	11.3 11.3	2.7 5.7	34.9 34.9								
Group IX.—Eclampsia ..	1,000 11.89	0.33 0.33	6.31 6.31	89 4	6.6 ..	—	1.9 ..	—	+ + + + + + i	24	18	8.4 8.4	6.5 6.5	1.4 1.4	23.3 23.3								
	1,770 9.91	0.65 0.65	6.87 6.87	68 8	3.3 ..	—	2.9 160	—	+ + + + + + i	18	27	8.4 8.4	6.5 6.5	1.4 1.4	15.9 15.9								
Group XI.—Haemorrhage ..	1,610 11.69	0.87 0.42	13.24 7.14	70 5	3.3 ..	—	1.6 160	++	+ + + + + + i	49	39	10.3 10.3	1.8 1.8	11.9 11.9	59 ..								
	1,360 11.02	0.54 0.54	7.51 7.51	69 6	3.3 ..	—	2.1 200	++	+ + + + + + i	61	..	29				
Group XV.—Toxæmias in Previous Pregnancies ..	4,536 14.06	0.41 0.69	7.71 4.84	86 4	1 ..	—	0.9 ..	—	+ + + + + + i	28	21	13.2 9.1	1.3 1.3	4.3 4.3	63 ..								
	1,000 7.26	0.18 0.18	6.17 12.12	71 12	3.3 ..	—	2.6 150	—	+ + + + + + i	63	43	29.6 32.4	9.3 9.7	2.2 2.2	6.7 6.7								
Group XIII.—Inductions ..	2,220 25.97	0.53 0.53	15.60 15.60	78 3	3.3 ..	—	2.0 180	++	+ + + + + + i	155	105	72.9				
	600 12.29	1.13 1.13	8.25 8.25	70 11	10 ..	—	3.3 120	++	+ + + + + + i	50	..	23.5				
Group XIV.—Deaths ..	1,040 6.36	0.66 0.66	4.54 4.54	66 12	3.3 ..	—	1.8 130	—	+ + + + + + i	22	..	10.3				
	1,400 ..	8.58 ..	0.18 ..	6.17 ..	65 2	3.3 ..	—	0.9 140	—	+ + + + + + i	115	..	26			
	1,150 ..	7.52 ..	0.39 ..	5.36 ..	66 6	3.3 ..	—	2.5 118	++	+ + + + + + i	31	30	15 7.8	1.3 1.3	11.6 11.6	50			

In the group in which the previous pregnancy had been complicated by toxæmia (Group XV) there is a tendency to show increasing renal impairment rather than hepatic involvement in succeeding pregnancies.

Among the patients requiring induction on clinical grounds (Group XIII) renal inefficiency is recognized by high blood urea and low urea concentration and frequently there is the further complication of hepatic inefficiency as shown by a positive response to the Fouchet test.

This is also characteristic of Group XIV in which several cases ended fatally.

DISCUSSION ON INDIVIDUAL TESTS.

Renal Efficiency Tests.

Urea Concentration.

In normal pregnancy only about 7% of the women tested had definitely low urea concentrations (that is, a urea concentration of less than 1.5%), whereas the figures varied from 14% in eclampsia to 45% in chronic nephritis. By taking 1.5% to 2% as low normal values, impaired kidney function was detected in about 80% of the patients of the groups of chronic nephritis and nephritic albuminuria.

In eclampsia and pre-eclampsia the urea concentration test varied from normal, but the extreme figures of the definite nephritics were not encountered. Thus, in eclampsia and pre-eclampsia there was evidence of kidney involvement in certain patients, but not to the extent shown in the true nephritic patients. In pyelitis 13% of the patients had low urea concentration, the remainder being normal.

Bourne⁽¹⁾ holds that this test is very valuable in true nephritis, but that its application to determine the condition of the kidney in the toxæmias of pregnancy is of little value, as the condition of the kidney alters very rapidly. If, however, the kidney is definitely damaged, it seems most unlikely that its condition will alter so rapidly as to destroy the

usefulness of this test. In certain cases in which the urea concentration was very low, the test was repeated after the interval of a few days and the percentage of urea did not alter materially. The readings of the results of the test applied to the urine of five patients are given. (i) On March 12, 1926, it was 1.9%, on March 29 it was 1.8%; (ii) on June 10 it was 2.1%, on June 15 it was 1.9%; (iii) on June 25 it was 2.1%, on July 5 it was 1.8%; (iv) on October 12 it was 1.2%, on October 15 it was 1.3%; (v) on November 11 it was 1.6%, on November 18 it was 1.9%.

In one patient urea concentration of 0.9% was found. Blood urea content was normal and there was only a slight Van den Bergh reaction; the clinical condition seemed good. Two months later the blood urea was found to be over 200 milligrammes per hundred cubic centimetres of blood and the patient died a few days after delivery. The *post mortem* examination revealed subacute nephritis, both kidneys being affected.

This test in conjunction with the diastatic index is very useful in distinguishing the nephritic type of toxæmia. Further, as will be shown later, certain patients who have had "kidney trouble" or eclampsia in previous pregnancies, tend to show increased kidney involvement in subsequent pregnancies and to show signs of toxæmia at an earlier stage of pregnancy.

Diastatic Index.

Although an estimation of diastase in the urine of a large number of eclamptic and pre-eclamptic patients was made, values greatly exceeding the normal figures of 6.6-30 units as found by Wesselow and Wyatt⁽²⁾ were not obtained. The highest figure was thirty-three units and this occurred in only five out of the total number of diastatic tests.

On the whole low urea concentration was accompanied by low diastatic index and this was of general occurrence in nephritic toxæmias.

DIASTATIC INDEX.

211 CASES.

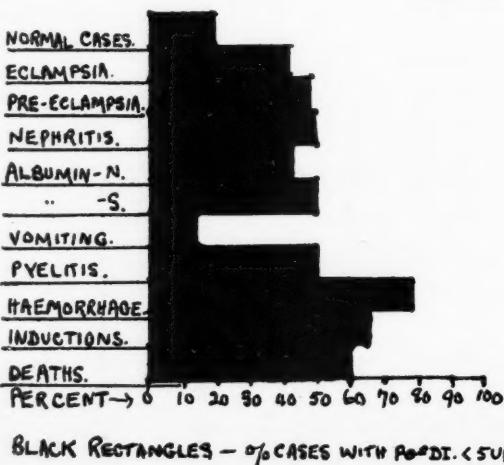


FIGURE II.

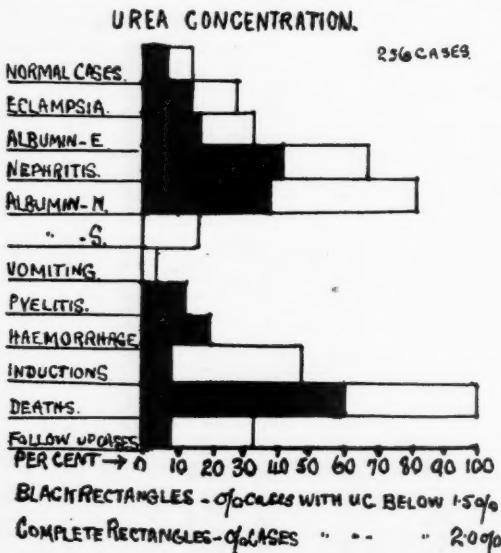


FIGURE I.

Blood Urea.

The normal urea content of the blood of pregnant women has been generally accepted as twenty to thirty milligrammes per hundred cubic centimetres of blood. In 30% of our normal patients the blood urea was greater than thirty milligrammes and in 15% above forty milligrammes (Table I).

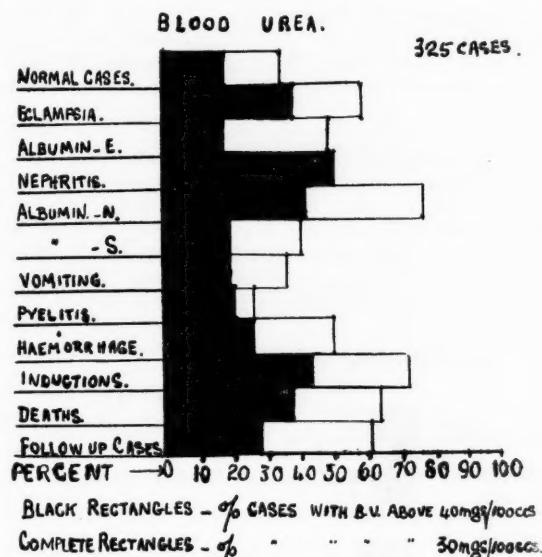


FIGURE III.

In 50% to 70% the nephritic group (nephritis and nephritic albuminuria) the blood urea was greater than thirty milligrammes and in 50% it was definitely high, that is, above forty milligrammes.

An increased incidence of abnormal figures was found in the eclamptic patients, nearly 40% being above forty milligrammes. In pre-eclampsia the percentage of patients with high blood urea was identical with that of the normal group, but 32% fell in the high normal group.

Thus it seems certain that there is some degree of kidney impairment in eclampsia.

Stander⁽³⁾ and Stander and Radelet⁽⁴⁾ state that there is a slight but definite decrease in blood urea in eclampsia. The figures obtained by us in this group do not support this statement, 58% of the patients having blood urea above thirty milligrammes and 32% falling between twenty and thirty milligrammes, whilst only about 10% are below normal values.

Non-Protein Nitrogen in Blood.

It has been stated by Berkeley, Dodds and Walker⁽⁵⁾ that the non-protein nitrogen value is more reliable than blood urea as an indication of the necessity for induction, since this value includes nitrogen which in the form of ammonia may have been utilized to neutralize acids present in the condition of acidosis, as well as the nitrogen present as urea, uric acid and creatinine. Hence in such conditions the blood urea tends to be low, but the non-

protein nitrogen remains practically unaltered. Myers⁽⁶⁾ regards forty milligrammes non-protein nitrogen per hundred cubic centimetres of blood as the standard above which the necessity for induction is indicated.

Taking this value as the limit of normality, the non-protein nitrogen of 28% of our normal patients exceeded this figure. In eclampsia, pre-eclampsia and nephritis 14% to 25% of the patients had non-protein nitrogen above forty milligrammes and in the nephritic types of albuminuria this value was exceeded in 37% of patients. According to Stander⁽³⁾ the non-protein nitrogen in the blood increases in vomiting and nephritis, but our figures failed to confirm this statement, at any rate in the case of vomiting. Among the patients with non-protein nitrogen above forty milligrammes, six required termination of pregnancy; one with severe eclampsia had fifteen convulsions and there was also one with severe nephritis. The condition in other patients cleared up on treatment.

Among the patients requiring induction the non-protein nitrogen was estimated in eleven and in six of these the value was above forty milligrammes.

Although this test is certainly not an absolute guide as to the necessity for induction, it seems advisable to watch carefully the progress of any patient showing non-protein nitrogen above forty milligrammes. In one patient all the tests were

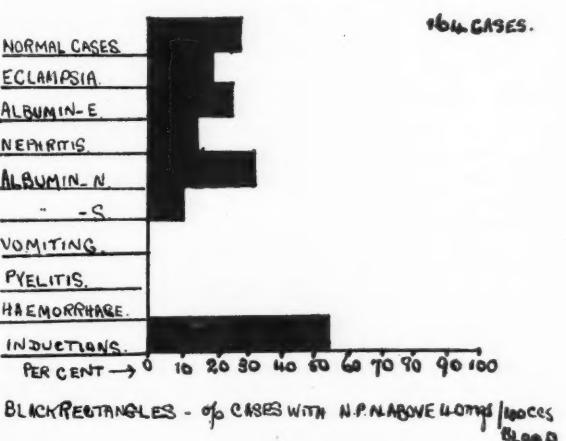
NON PROTEIN NITROGEN.

FIGURE IV.

practically normal with the exception of non-protein nitrogen which was sixty-two milligrammes and induction was necessary on clinical grounds.

Uric Acid

When the kidney is damaged, the uric acid in the blood tends to increase before the blood urea or creatinine shows any alteration. Thus, an increase in uric acid in the blood has always been taken as an indication of renal inefficiency.

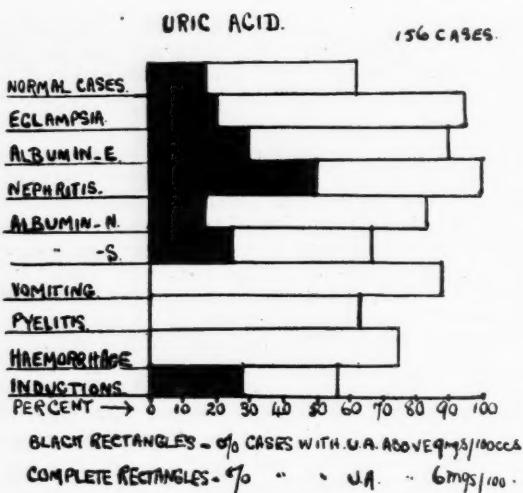


FIGURE V.

The recent work of Mann, however, has shown that the piling up of uric acid in the blood may be due to hepatic inefficiency rather than kidney involvement.

It has, therefore, been necessary to interpret increases in uric acid in the light of the results of other tests obtained in each case. The figures for uric acid were uniformly higher than those generally quoted. This applies even to normal patients of whom we found only 9% with values below three milligrammes per hundred cubic centimetres and 36% below six milligrammes. King and Denis⁽⁷⁾ give 1.9 to 3.2 milligrammes as the value of uric acid for normal persons and Stander⁽⁸⁾ quotes 2.8 milligrammes as the average normal value. The highest figures occurred in the nephritic group in which the uric acid exceeded eight milligrammes in 50% of the patients. Of normal patients 70% had a uric acid value greater than six milligrammes. In eclampsia and pre-eclampsia 20% and 30% had a uric acid value exceeding nine milligrammes and 25% of the patients with slight albuminuria had a value above nine milligrammes.

The statement of King and Denis⁽⁷⁾ that in eclampsia and pre-eclampsia the more severely toxic patients had higher uric acid values does not agree with the figures in our tables. The condition of some patients with extreme figures cleared up rapidly on treatment, whilst that of others with low uric acid values was more difficult to deal with.

Similarly in the nephritic and vomiting groups the amount of uric acid was not useful in indicating the severity of the toxæmia. Thus, although uric acid in the blood increases in all types of toxæmia of pregnancy, no satisfactory conclusion as to the type or the severity of toxæmia can be ascertained by its estimation.

Creatinine.
(158 Cases.)

Creatinine is present in the blood of normal pregnant women to the extent of one to two milli-

grammes per hundred cubic centimetres of blood. Creatinine is more readily excreted by the kidney than either urea or uric acid, hence the presence of excessive amounts indicates definite renal damage. Practically 90% of the creatinin values obtained fell within the normal range. In eight patients the creatinin value was from 2.0 to 2.3 milligrammes and in five of these the toxæmia was severe; labour had to be induced three times. The test was not helpful in deciding the type of toxæmia, but when the blood urea is above forty milligrammes, it may be useful in deciding the severity of the toxæmia.

Undetermined Nitrogen.

In an endeavour to find a more useful test than those already enumerated, the undetermined nitrogen fraction of the non-protein nitrogen (that is, the residue after subtracting the nitrogen present as urea, uric acid and creatinin) was examined in the blood of 94 patients. The majority of values fell between ten and fifteen milligrammes, but the

UNDETERMINED NITROGEN.

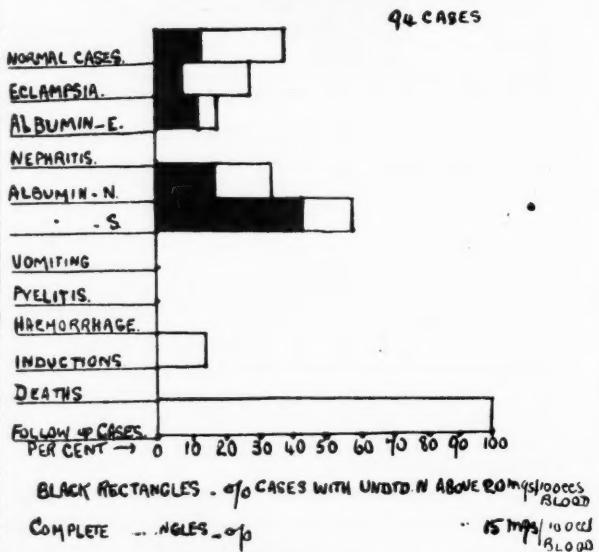


FIGURE VI.

results varied considerably in each group of toxæmias. The figures appeared to be somewhat lower in nephritis and pyelitis, but no useful conclusion could be drawn.

Ratio of Blood Urea Nitrogen to Non-Protein Nitrogen.

Stander, Duncan and Sisson⁽⁸⁾ worked out a percentage ratio of the blood urea nitrogen to the non-protein nitrogen in an attempt to get a figure constant for normal pregnancy which might vary in the different toxæmias.

They observed an increase in this ratio in nephritis and a decrease in eclampsia and pre-eclampsia. Our results showed that in the chronic

nephritis group two-thirds of the patients had a ratio above the normal value (40% to 50%); in eclampsia and albuminuria of labour 50% of the values were above normal and in pre-eclampsia 32% of the values were above normal. Some patients

RATIO OF B.U.NITROGEN TO NON-PROTEIN NITROGEN.

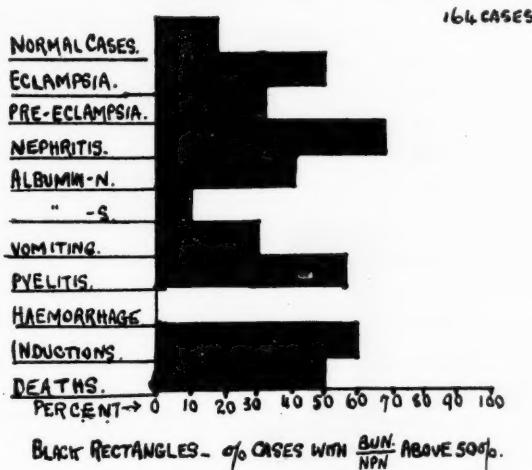


FIGURE VII.

with eclampsia and pre-eclampsia yielded low values, but it was by no means a general characteristic of these groups. Four out of six of those for whom induction of labour was required, and the ratio was determined, yielded values above 50%. This ratio, therefore, is of little use in determining the type of toxæmia, but may be helpful in judging the necessity for induction of labour.

DIACETIC ACID.

221 CASES.

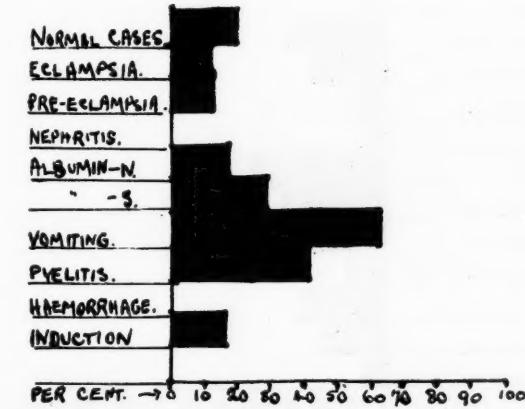


FIGURE VIII.

Acidosis.

Gerhardt's Test for Diacetic Acid and Rothera's Test for Diacetic Acid and Acetone.

Acetone as revealed by Rothera's test was found in all groups except the nephritic types of albuminuria; in 50% and more the patients in the several groups yielded a reaction. This agrees with the statement of Berkeley, Dodds and Walker that in 68% of pregnant women acetone is present in the urine.

Contrasted with this, diacetic acid was found in only a comparatively small percentage of patients. In the group of normal pregnant women only 20% had diacetic acid in comparison with 50% with acetone in the urine.

Of the patients with eclampsia 11% had diacetic acid in their urine, while 57% gave the acetone reaction. Of the patients with vomiting 67% had diacetic acid and 82% had acetone. Pyelitis was the only other group which comprised a large number of patients (42%) with a positive diacetic acid reaction. We are of the opinion that the acetone present in so large a number of patients is due to the dietetic treatment and is not pathological. Diacetic acid and acetone should only be regarded as being pathological when they are present in relatively large quantities, for example, in some patients over 500 milligrammes per litre were present in the urine.

Ammonia Coefficient.

The results of the ammonia coefficient determination do not appear to be of great value. The highest percentage of patients with values above 10% occurred in the vomiting group. This is to be expected since in 64% of these patients large amounts of diacetic acid and acetone were present, indicating a condition of acidosis.

DIACETIC ACID AND ACETONE

221 CASES.

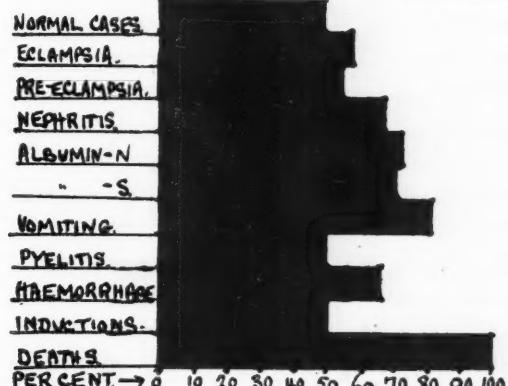


FIGURE IX.

AMMONIA COEFFICIENT.

226 CASES.

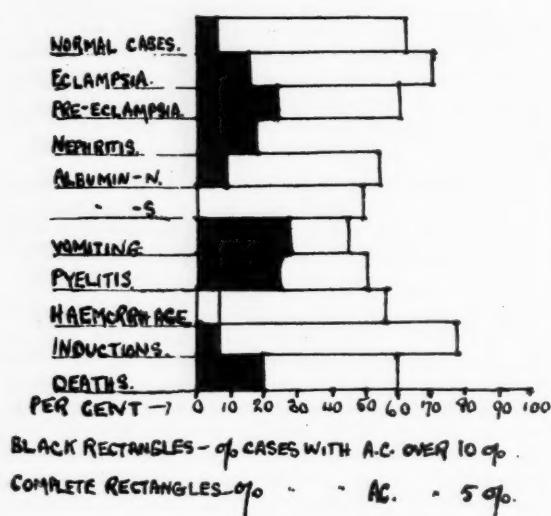


FIGURE X.

Hepatic Efficiency.

Van den Bergh Test and Fouchet Test.

Even in apparently normal women there was a tendency to obtain a Van den Bergh reaction. This, however, was not so frequent as in patients with pathological conditions. In normal women, for example, at least 40% yielded an indirect Van den Bergh reaction, associated in some with the occurrence of a Fouchet reaction. In other groups from 50% to 70% of the patients yielded a Van den Bergh reaction and an increased number yielded

VAN DEN BERGH.

280 Cases.

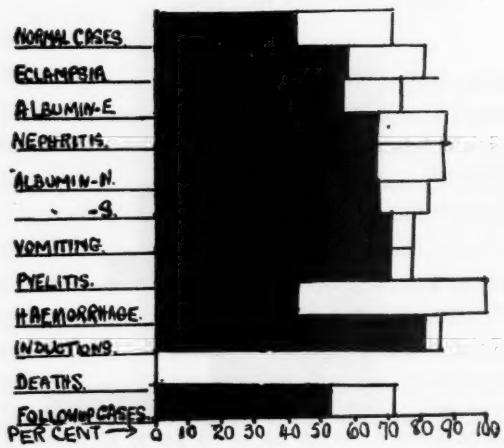


FIGURE XI.

FOUCHET.

280 CASES.

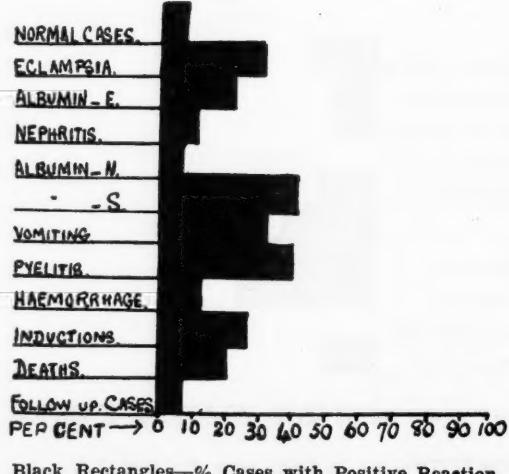
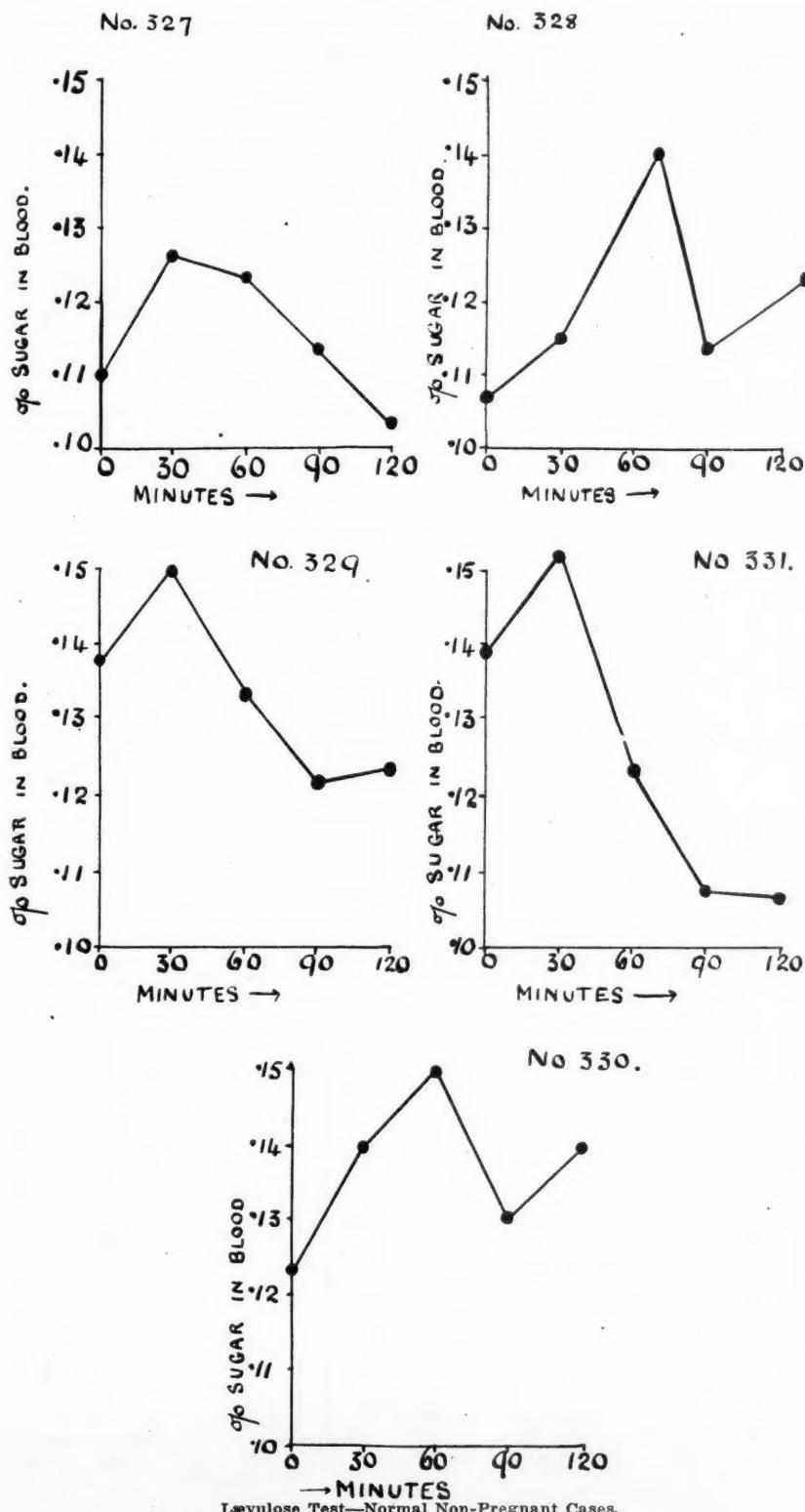


FIGURE XII.



coincides with the number of patients in this group yielding a positive response to the Fouchet test. This further confirms the presence in these patients of hepatic inefficiency. Otherwise urobilin was present in only a few patients in each group and did not appear to have any great significance.

Berkeley, Dodds and Walker⁽⁵⁾ state that urobilin and urobilinogen in the urine are the earliest and surest signs of hepatic impairment. They also state that induction should not occur until the liver tests yield positive results. We disagree with this statement, since in certain persons manifesting definite nephritic symptoms induction of labour was necessary and in them the hepatic function appeared to be normal. Many patients with whose blood definite reactions to the liver tests were obtained, proceeded satisfactorily without induction. Our views are in agreement with those expressed by Cruickshank, Hewitt and Couper in their report to the Medical Research Council which has reached us since the completion of our report.⁽¹³⁾

Uric Acid.

The uric acid test does not seem very helpful in determining the degree of hepatic efficiency in toxemias. Many patients with undoubtedly liver damage as shown by strongly positive Fouchet reaction yielded low uric acid values, whilst of many others, although the uric acid value was high, the liver function seemed to be normal.

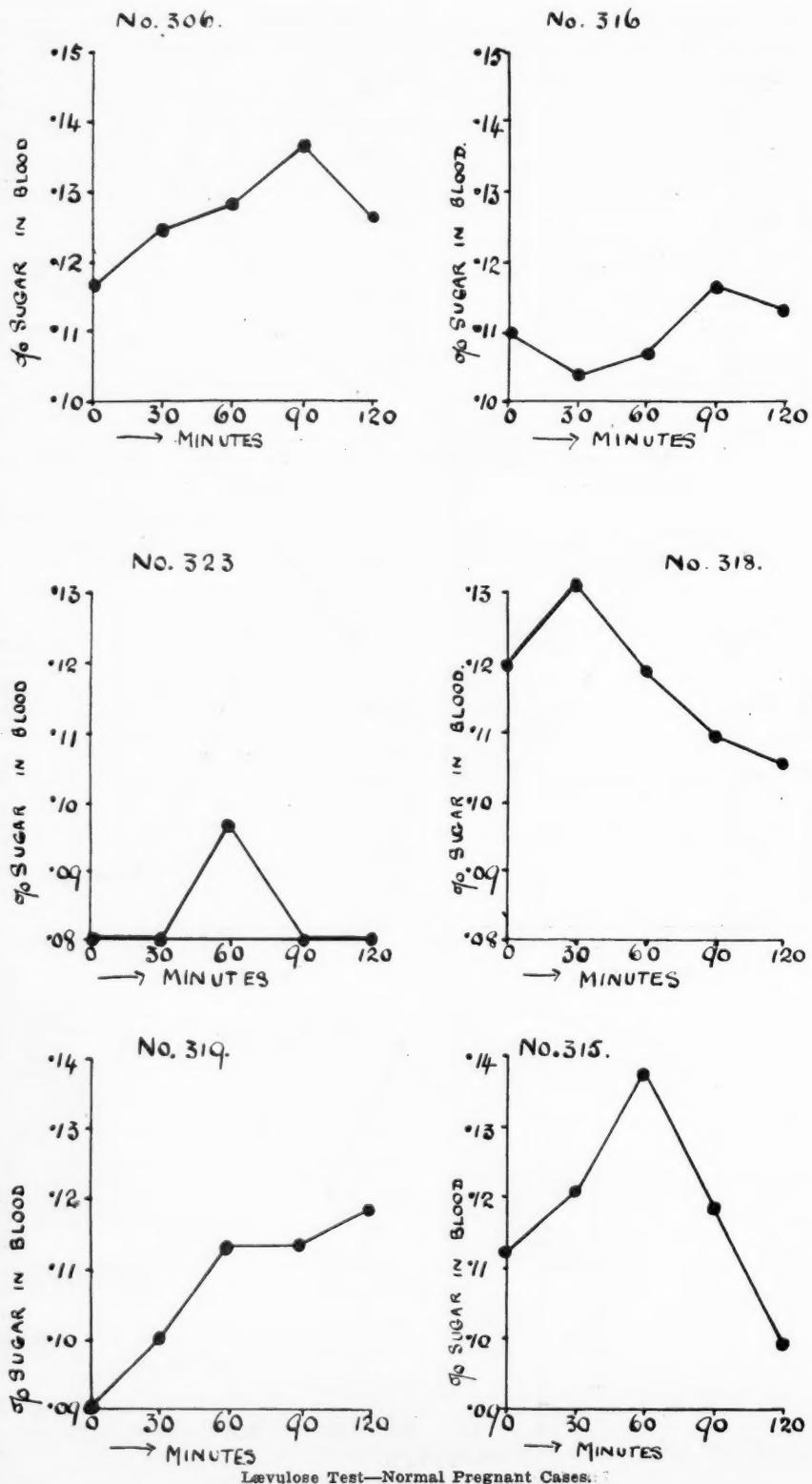
Lævulose Test.

McLean and de Wesselow⁽⁹⁾ have shown that the ingestion of lævulose

causes no appreciable rise in blood sugar in the normal individual when given in ordinary doses, but that when the liver is deficient as the result either of toxic processes or of diabetes, a curve more or less identical with that resulting from the ingestion of glucose is obtained.

Wyatt and de Wessel⁽²⁾ mention the application of the lævulose test to determine the extent of liver damage in eclampsia and give two cases of eclampsia in which a considerable rise in blood sugar was registered. They also quote the cases of two patients in whom the blood sugar before and after the ingestion of lævulose did not alter and in whom the liver function appeared to be normal. Further, they mention the statement of Gottschalk that the blood sugar rises to an abnormally high level after a lævulose meal in a fair proportion of pregnant women. He holds this to indicate a mild degree of impairment of hepatic function.

This test has been performed on a series of non-pregnant women (five), normal pregnant women (twenty-two), women with eclamptic and pre-eclamptic conditions (fourteen) and women with vomiting of pregnancy (eight) and a small group of women with slight albuminuria and pyelitis. It was found that the normal non-pregnant group showed very slight increases in blood sugar, the greatest increase being 0.032% (that is, an increase from



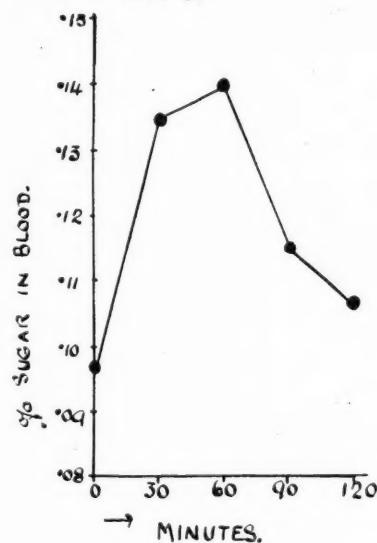
0.106% to 0.138%). We have arbitrarily taken an increase up to 0.035% sugar as being normal. On this basis 50% of our women with normal pregnancies proved to be normal, 36% showed a rise of from 0.035% to 0.045% of sugar, possibly indicating a mild degree of hepatic involvement, and 14% showed a moderate degree of involvement.

In the eclamptic group 43% of the patients appeared to be normal with respect to liver func-

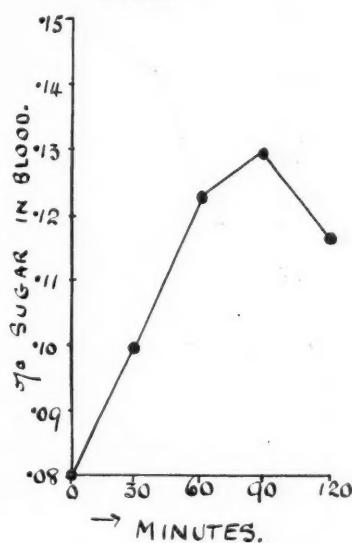
tion and 7% to have some slight liver inefficiency. In the remaining 50% there was a considerable increase in blood sugar, in one the increase being as great as 0.101%.

Another interesting feature of the laevulose curves was the fact that the majority of those with the greatest increases tended to be prolonged (see Charts Nos. 305, 121, 219, 325, 129, 226). This seems to be a further indication of more severe hepatic

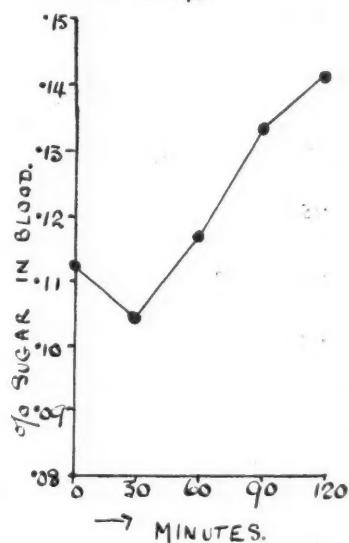
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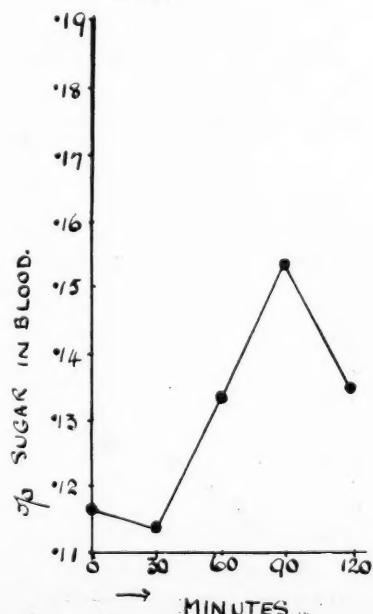
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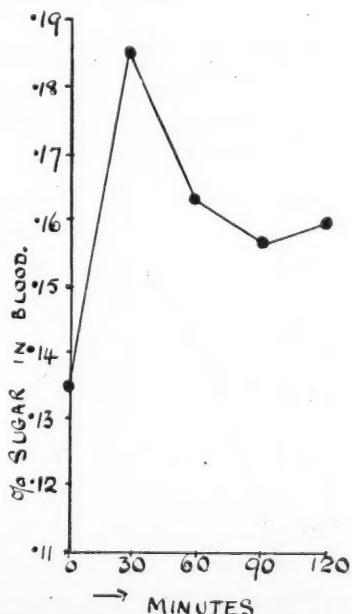
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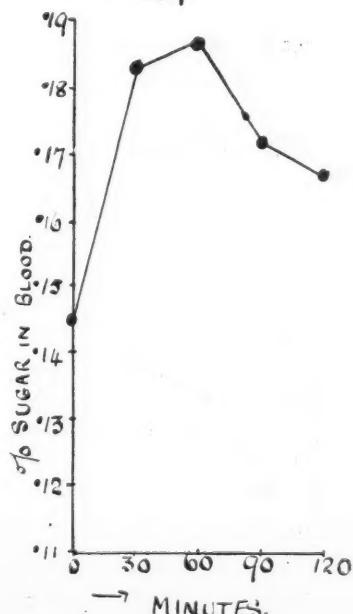
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No. 310.



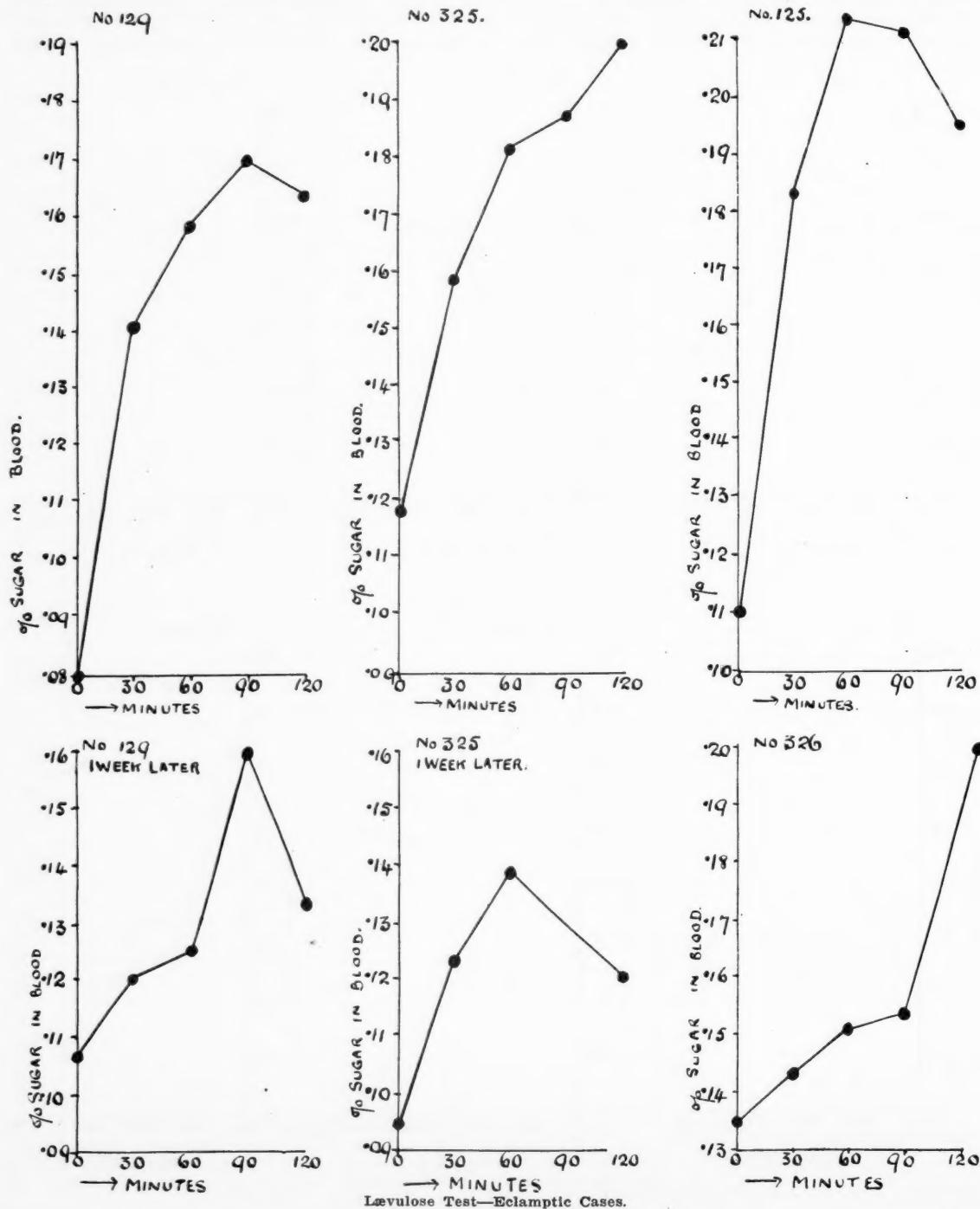
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Laevulose Test—Normal Pregnant Cases.

damage than is the case when the blood sugar returns to normal within two hours after the ingestion of laevulose. In four cases a study of the laevulose curves obtained a few hours after convulsions and further curves obtained some days later showed considerable variation. According to

the height of the curve and the time over which the increase was prolonged, an improvement in hepatic function is indicated (see Charts Nos. 128, 129, 325, 223). This improvement coincided with the improvement in the clinical condition of the patient. In some patients with eclampsia in whom the



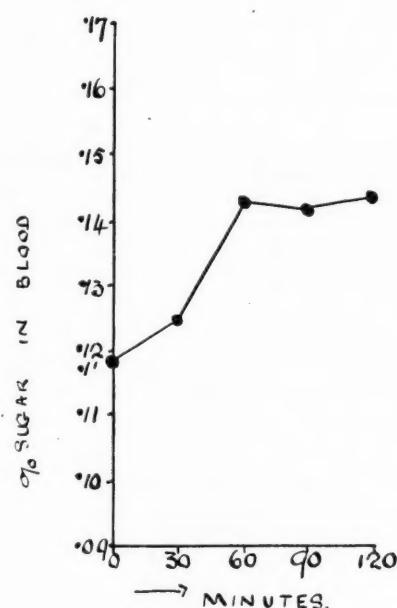
liver function appeared to be normal, there was definite proof of renal inefficiency (see Chart No. 223).

Thus it appears possible by means of the urea concentration test and the lactulose test to separate eclampsia into a hepatic type and a renal type;

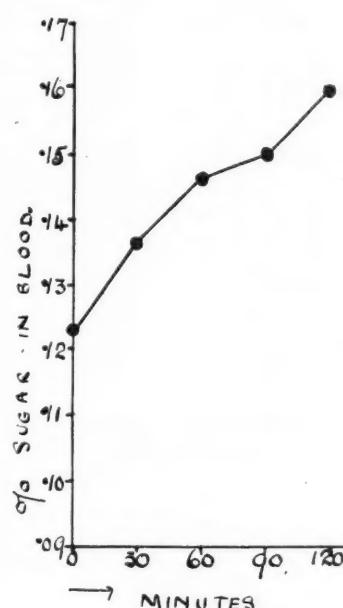
there are, of course, certain cases in which both liver and kidneys are involved.

In the vomiting group seven out of the eight patients on whom a lactulose test was performed, had definite liver damage; one had mild liver inefficiency. A few patients with pyelitis and other

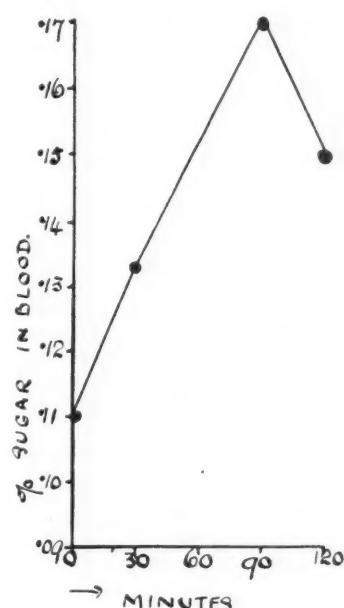
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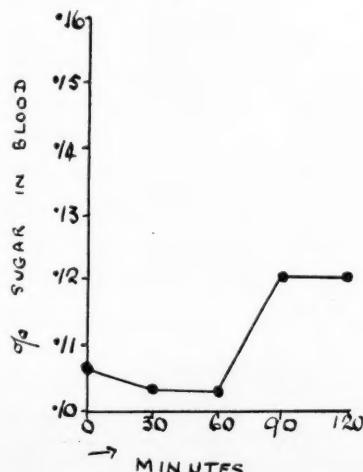
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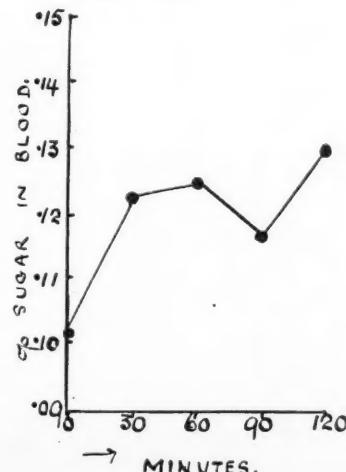
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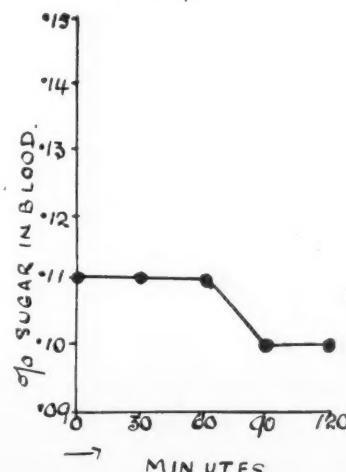
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No. 223



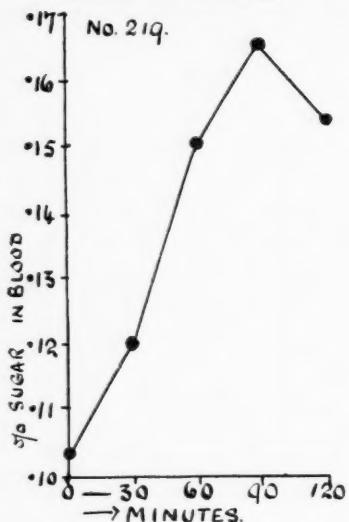
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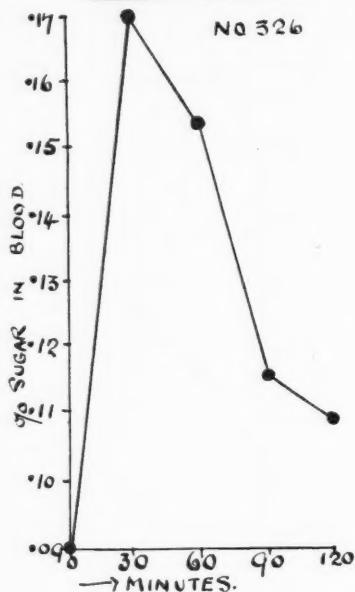
conditions also had signs of hepatic inefficiency. The number of patients tested by this means was not large owing to the difficulty in procuring

lævulose, but the results seem to indicate that the test may be very useful in detecting liver inefficiency in eclampsia and vomiting. We were not

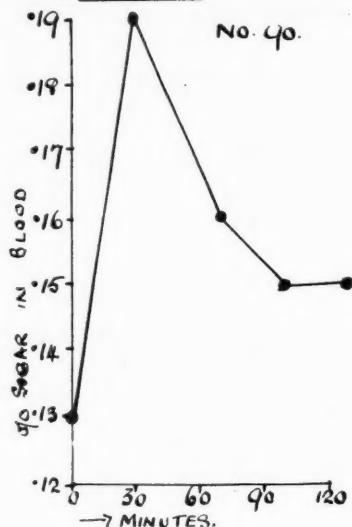
4. PRE-ECLAMPSIA.



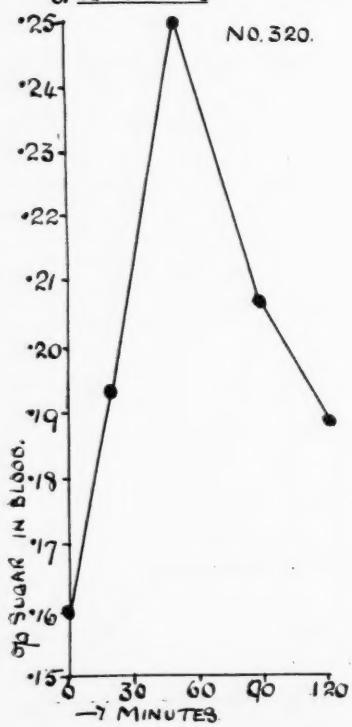
PRE-ECLAMPSIA.



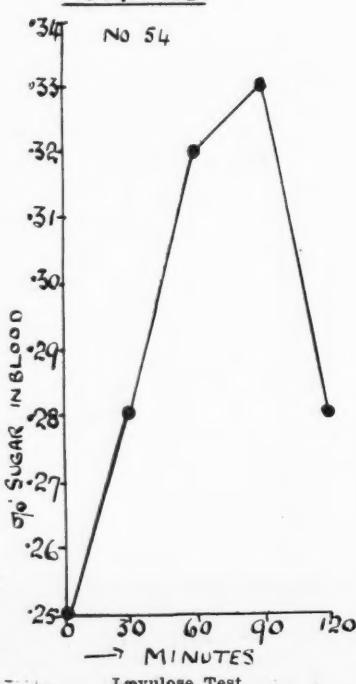
5. PYELITIS.



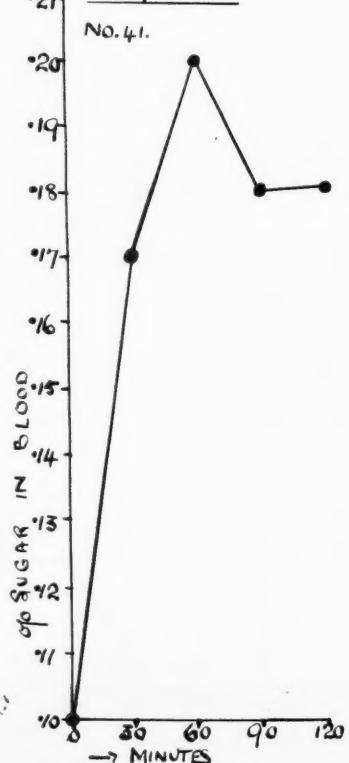
6. VOMITING.



VOMITING.



VOMITING.



able to test eclamptic patients before the onset of convulsions and further work must be done before the value of this test as a means of foretelling the possible development of eclampsia in pregnant women can be gauged.

CLINICAL TYPES AND THEIR BIOCHEMICAL FINDINGS.

In reviewing the findings in the different clinical groups a very simple clinical classification has been adopted, because it was very difficult to differentiate absolutely pure types. This lack of exact definition in type probably arises from the fact that a toxæmic case is a composite manifestation of (i) a general toxic condition, (ii) pregnancy kidney, superimposed in some cases on (iii) a pre-existing kidney condition.

This is very evident when the detailed findings in even the most definite cases are examined. For example, urobilin may appear in the urine of a patient with frank nephritis and a Fouchet reaction is quite frequently obtained with the blood of patients suffering from pyelitis. Alternatively, some patients with hyperemesis yield high blood urea figures and low urea concentration values and in some patients with accidental haemorrhage all these abnormal chemical findings appear. Eclampsia provides an obviously composite picture.

We cannot give definite groupings on chemical grounds alone. Each test or group of tests appears as one part of a composite picture; the patient

is not affected in regard to only one particular organ.

On the other hand, we find that there is a definite parallelism between the chemical findings and the clinical groupings; the average chemical findings in each group are characteristic.

For the present it is wiser to rely on a clinical classification as to main groups. In actual practice (and quite apart from the academic aspect) the pure clinical outlook is incomplete.

It will be found extremely useful to use a simple general classification in the sense of a coarse adjustment of our outlook and our chemical findings as a fine adjustment.

This reversion to the very simple classification may seem a retrograde step, but on the basis enunciated a more elaborate classification becomes unnecessary and the groups of Stander and Peckham,⁽¹⁰⁾ "eclampsia imposed on chronic nephritis" as distinct from "eclampsia" and the "low reserve kidney" become readily recognized as variations of main types.

Toxæmias have, therefore, been grouped into vomiting; pyelitis; albuminuria, including albuminuria of labour, pre-eclampsia and chronic nephritis and nephritic types; eclampsia.

In addition we have rather vague cases which seem purely hepatic in type and a loose group of unclassified slight albuminuria; to these two groups reference will be made later.

Accidental haemorrhage is also treated as it has been suggested that there is an underlying toxic basis.

In discussing the chemical findings in each of these groups there will not be a repetition of all the biochemical work done. The complete biochemical findings have been tabulated in Section I and reference will be made only to those tests bearing directly on the clinical aspect of the various cases.

VOMITING.

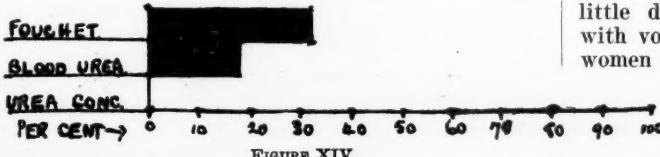
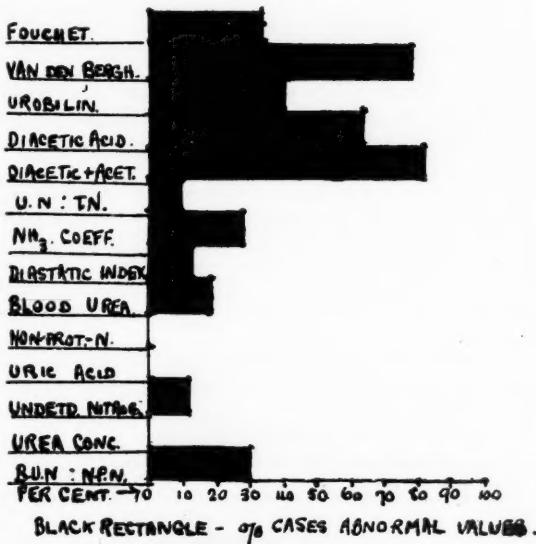


FIGURE XIV.

Vomiting of Pregnancy.

There were sixteen patients in the group of vomiting of pregnancy of whom three had severe hyperemesis.

The graphic tabulation, as would be expected, shows more evidence of hepatic than renal involvement.

The response to the Fouchet test is positive in every third patient and to the Van den Bergh test in three out of four, being quite frequently direct as well as indirect. Practically all patients with mild symptoms failed to yield a Fouchet reaction; a Fouchet reaction should be viewed with suspicion in this group.

Urobilin is present in the urine in 40% of the patients, but urobilin alone cannot be considered in a serious light.

The acetone incidence (80% of patients) provides little differentiation; apart from its association with vomiting it is present in half of the normal women and largely in the toxæmias. On the other

hand, diacetic acid has the highest incidence in this group, appearing in two-thirds of the patients as against one-

quarter of the normal pregnant women. This is approached only in the pyelitis group. The quantitative diacetic-acetone estimation has apparently no relation to the severity of the condition.

The debated ammonia coefficient provides no information and in contrast to Whiteridge Williams's claim for its usefulness in a negative sense, we may find it low in severe cases.

The lœvulose test showed definite liver damage in seven out of eight patients tested; this included mild as well as severe cases.

The kidney function tests show very little departure from normal. This is what would be expected. On the other hand the patients with high blood urea values were all severely affected and the three with the highest values required induction of labour.

It would seem that in a case of hyperemesis a high blood urea level and/or a Fouchet reaction should be viewed with suspicion and in the presence of any unsatisfactory response to treatment as an indication for early (not delayed) induction.

Pyelitis.

Seventeen patients had pyelitis and all had increased frequency of micturition with pain and pus in the urine. In many there was a raised and sometimes a high temperature. The urine of the majority of the patients contained albumin, often in considerable quantity.

The chemical findings in this group are rather unexpected and interesting.

PYELITIS.

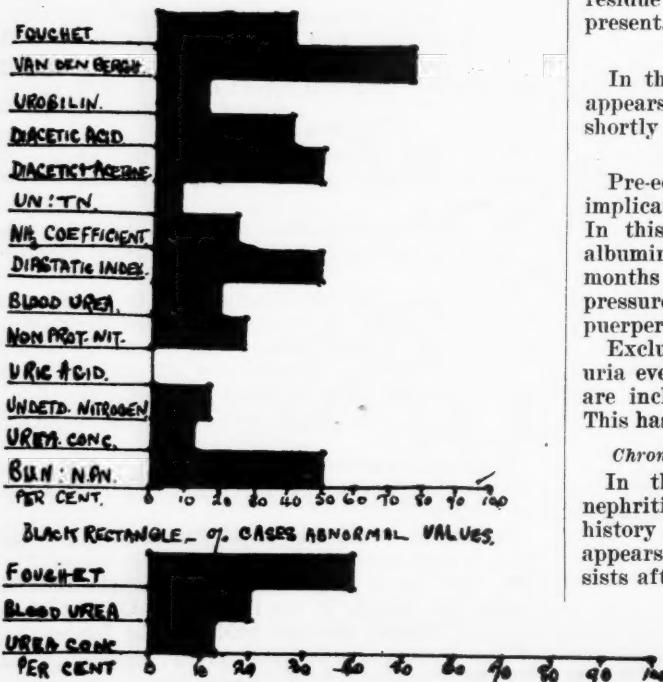


FIGURE XV.

There seems to be a very definite toxic factor, that is, the condition is not simply pyelitis *per se* and the majority of patients had albumin in the urine, two-thirds of them in considerable quantity.

It might be considered that the condition is really a pyelo-nephritis. Against the assumption of a pure pathological condition of the kidney we have only a slight incidence of a low urea concentration, 15% of the patients, 7% with a little above the normal, as against 50% to 80% of the patients with definite chronic nephritis and toxæmias with an underlying nephritic factor.

Abnormal blood urea figures again are relatively rare contrasted with 50% to 70% incidence in the nephritic series.

On the other hand the toxic factor shows itself in a Fouchet reaction in 40% of patients and a Van den Bergh reaction in 70% of patients. An unexplained point is the high uric acid in the few patients examined.

Labour was induced in only one patient; the chemical findings were satisfactory except for an abnormal lœvulose curve.

Another patient who had a very low urea concentration, did not have labour induced and died later with a blood urea of 222 milligrammes per hundred cubic centimetres of blood.

The relative safety of the pyelitis group lies in its renal efficiency.

Albuminuria.

The albuminuria group does not include the obvious types, vomiting, pyelitis, and eclampsia (albuminuria with convulsions). Its subdivision is simplified by discussing three defined types and a residue of cases in which only slight albuminuria is present.

Albuminuria of Labour.

In the group of albuminuria of labour albumin appears with the onset of labour and disappears shortly afterwards.

Pre-eclampsia.

Pre-eclampsia is used in its broad sense with no implication as to development of frank eclampsia. In this group are included patients with much albumin appearing in their urine in the later months of pregnancy, often with raised blood pressure and oedema, but clearing with the puerperium.

Excluded are patients with only slight albuminuria even in the presence of toxic symptoms; these are included in the group of slight albuminuria. This has been done to clarify the type.

Chronic Nephritis and Nephritic Type of Toxæmia.

In the group of chronic nephritis and the nephritic type of toxæmia there is either a definite history of pre-existing nephritis or else albumin appears in the urine early in pregnancy and persists after the puerperium. There is often evidence

of cardio-vascular involvement and a very high blood pressure. Some patients have albuminuric retinitis.

In this group those patients in whom there is marked albumin and

severe toxic symptoms, such as epigastric pain and vomiting, have been distinguished as having the nephritic type of toxæmia. This distinction from apparently pure chronic nephritis is not always easy, but as will appear from the tabulation of chemical findings is quite unnecessary.

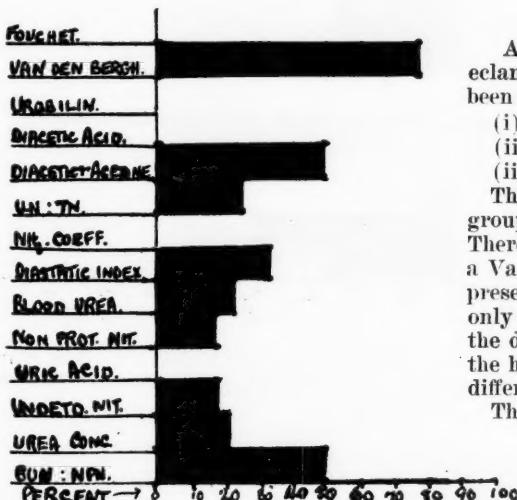
Slight Albuminuria.

There are many patients outside the main groups in whom albumin in the urine is not profuse, but in whom there is a definite toxic element. These patients have been grouped together and serve the useful purpose of (i) clarifying the main types and (ii) bringing into notice slight albuminuria.

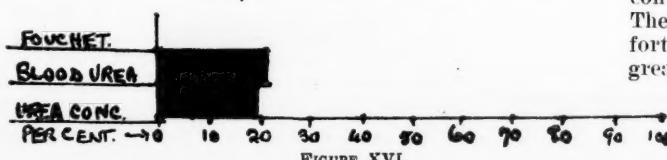
Albuminuria of Labour.

There were thirteen patients with albumin in the urine under the stress of labour, but the albumin cleared up rapidly afterwards. As would be expected the chemical findings do not depart much from those obtained with the blood and urine of normal patients, although there is a tendency to diminished kidney function, the urea concentration being low in 20% of the patients and the blood urea high in 20%.

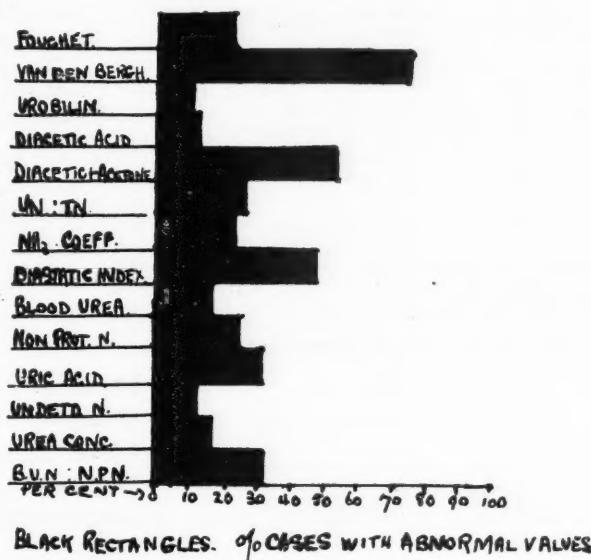
ALBUMIN OF LABOR.



BLACK RECTANGLE - % CASES WITH ABNORMAL VALUES.



Pre-Eclampsia.



BLACK RECTANGLES. % CASES WITH ABNORMAL VALUES

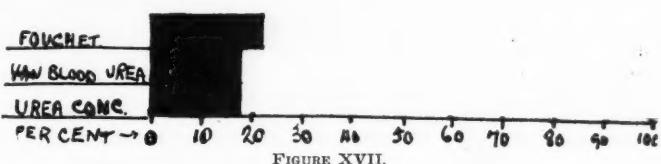


FIGURE XVII.

Pre-eclampsia.

As already explained there is no implication as to frank eclampsia and to clarify the type the following criteria have been fixed upon:

- (i) Albumin amounts at least to one-fifth on boiling.
- (ii) It appears in the later months of pregnancy.
- (iii) It clears up during the puerperium.

The greater number of patients (eighty-four) belong to this group. The departure from normality is not very definite. There is a Fouchet reaction in nearly 30% of the patients and a Van den Bergh reaction in over 60%. Urobilin is not often present and while acetone is common, diacetic acid appeared in only about 12% of the patients. In only two patients did the diastatic index reach thirty units, which is in contrast to the high figures noted by de Wesselow as one of the points of differentiation from the nephritic types.

The urea concentration is definitely low in only about 16% of the patients compared with 7% of the normal women and 40% of the patients with nephritic types.

The blood urea is high in 16% of the patients as compared with the normal women and as contrasted with 50% with nephritic types. The non-protein nitrogen is greater than forty milligrammes in 25% of patients and greater than seventy milligrammes in 12%.

In nine out of the eighty-four women labour was induced. The main findings are given in Table III.

TABLE III.

No.	Blood Urea Concentration.	Urea Concentration in Urine.	Non-Protein Nitrogen.	Response to Fouchet Test.
18	52	1.0	59	—
19	57	1.8	61	Slight
55	69	2.5	43	—
78	36	1.7	62	—
83	35	1.7	38	++
104	31	2.1	—	—
131	29	2.0	—	—
142	24	3.8	—	—
(3 weeks previously)				
73	38	1.6	—	+

Induction of labour was performed on these patients purely on clinical grounds, but the trend towards adverse chemical findings is interesting.

Chronic Nephritis and Nephritic Type of Toxæmia.

The criteria adopted are:

- (i) Pre-existing nephritis.
- (ii) Onset of albuminuria early in pregnancy.

- (iii) Persistence after the puerperium.

If there is a development of severe albuminuria and toxic symptoms, a nephritic type of toxæmia is differentiated.

The comparison of the two diagrams will reveal that the distinction in type is largely clinical and not biochemical and this similarity is more evident when we contrast the findings for pre-eclampsia.

The blood urea is high (that is, greater than forty milligrammes) in 50% of the

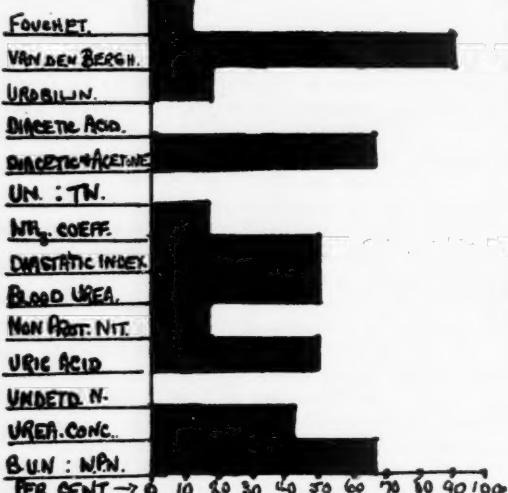


FIGURE XVIII.

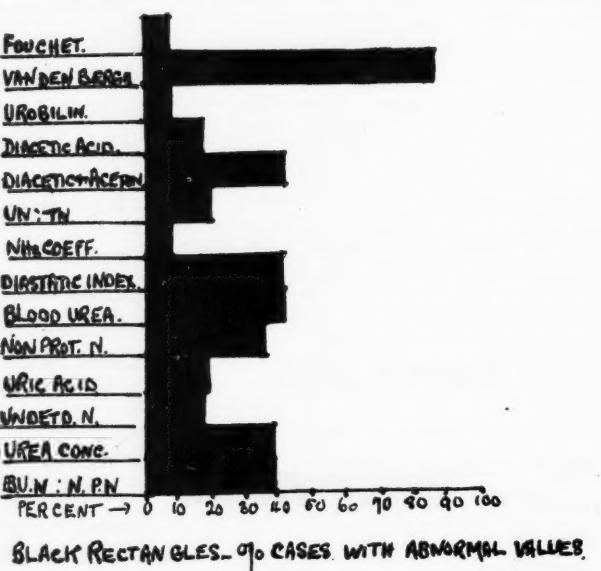


FIGURE XIX.

(see Table IV). In addition there are four deaths, all with highly abnormal responses to the renal tests.

Slight Albuminuria.

As already explained, the group of slight albuminuria is a rather motley residual group. The grouping, however, of these indeterminate cases serves to clarify the main types and to draw attention to a definite and often severe toxic element associated with slight amount of albumin in the urine.

The group has more clinical standing as a probable link with a few conditions which seem to be purely hepatic in origin. This is borne out by the chemical findings.

patients as against 16% of the pre-eclamptic patients. The urea concentration is low in 45% to 50% of the patients and includes low normal values (1.5% to 2%) in nearly 80% of the patients.

Non-protein nitrogen is high in 60% of the blood samples tested, but there is a tendency to high non-protein nitrogen in all groups throughout our series.

The diastatic index is low in 50% of the patients. This parallels the departure of the other groups from normality and can hardly be considered as evidence of kidney involvement *per se*.

The response to the Fouchet test here differs from the other groups in being rarely positive. In six of the twenty-six women labour had to be induced

TABLE IV.

No.	Blood Urea Concentration.	Urea Concentration of the Urine.	Non-Protein Nitrogen.
1	222	1.7	—
16	63	1.5	43
4	49	1.3	—
281	74	2.1	39
105	31	2.0	32
138	26	2.6	—

In all the twenty-five patients the urea concentration test showed no departure from normal and the blood urea was high in only 16%. Non-protein nitrogen is equally low.

Contrasted with the nephritic type, the response to the Fouchet test is positive in 30% of the patients. This suggestion of liver involvement is borne out by the result of the lœvulose test in a limited number of patients. In this connexion we may mention a small group of six patients whose conditions appeared almost purely hepatic in type. Little or no albumin is present, but toxic symptoms, headache, vomiting, some oedema, flashes of light in one and mild jaundice (three patients) appear.

The chemical findings are tabulated in Table II. One typical case is No. 257: No albumin, blood urea fourteen milligrammes, non-protein nitrogen nineteen milligrammes, urea concentration 2.6%, a reaction to the Fouchet test, a posi-

tive direct reaction to the Van den Bergh test, strongly diacetic acid and acetone reactions and reaction to the lœvulose test.

The Fouchet and direct Van den Bergh reactions seem characteristic and two of the three patients tested gave abnormal responses to the lœvulose test. On the other hand the results of the renal tests (except for one high blood urea) appear to be normal.

It is apparent that the tendency to assess a case by the amount of albumin present in the urine is unjustified. Chemical investigation of a case with slight albumin in the urine may reveal that the condition is physiologically quite simple. On the other hand, we might find evidence of renal involvement as in the previous sub-group or hepatic involvement in the present group.

ECLAMPSIA.

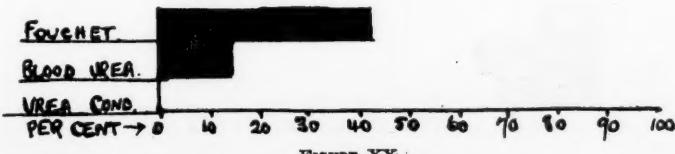
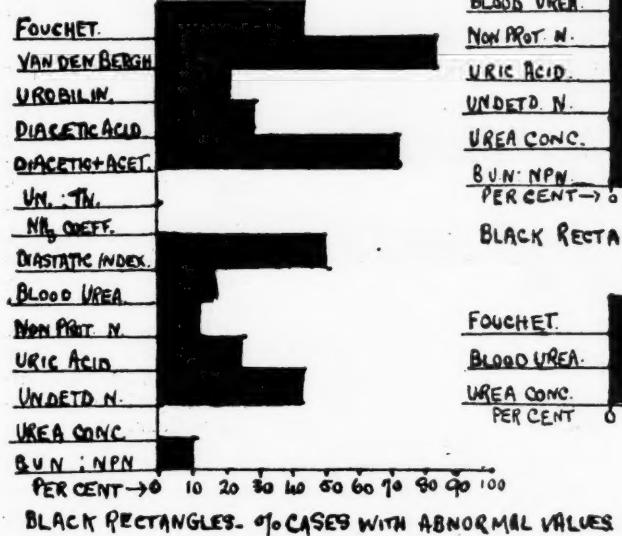


FIGURE XXI.

Eclampsia.

Much chemical work has been done in the past on the biochemistry of eclampsia. The present work serves to confirm this. The incidence of the tests is variable and there is no doubt that eclampsia is a composite picture. In some cases the toxic tendency is hepatic; there are patients with absolutely normal kidney function whose blood yields a Fouchet, direct

Van den Bergh and abnormal lactulose reactions. Other conditions seem to be purely renal, while many show composite findings.

The response to the Fouchet test is positive in 31% of the patients; of those on whom a lactulose test was performed, 50% gave definite increases in blood sugar, one increase being as great as 0.101%. It is interesting to note the sustained increase in the majority of curves showing the greatest increase in blood sugar in this group and also the tendency for improvement with convalescence.

The blood urea figures are high in 37% of the patients, non-protein nitrogen in 40% and urea concentration is low in 20%. This is more evident than in the normal group, parallels the findings in the pre-eclamptic group, but does not approach those in the nephritic

group. A partial tabulation of previous eclamptics (eleven patients) shows an almost complete restoration of the hepatic function, but a tendency to persistence of the renal impairment.

It is difficult to correlate the chemical findings with severity of toxæmia, particularly as the tests were not all performed at the same phase. From the point of view of ultimate prognosis, however, unsatisfactory responses to renal tests imply much more danger than unsatisfactory responses to hepatic tests.

Accidental Haemorrhage.

There has been considerable discussion as to the relation of albuminuria and toxæmia to accidental haemorrhage. In our own series there were seventeen cases, ten revealed, four concealed, and three both concealed and revealed. Definite albuminuria was present in ten out of fourteen of the patients. This may be due to placental infarction (Young) or to an associated toxæmia.

The chemical findings are not very striking, although abnormal responses to the Fouchet, blood urea and urea concentration tests appear rather more frequently than with normal patients. Blood uric acid is abnormally high in all the patients, but the number was limited. It would seem, therefore, that an associated toxic factor is not very powerful.

ACCIDENTAL HAEMORRHAGE.

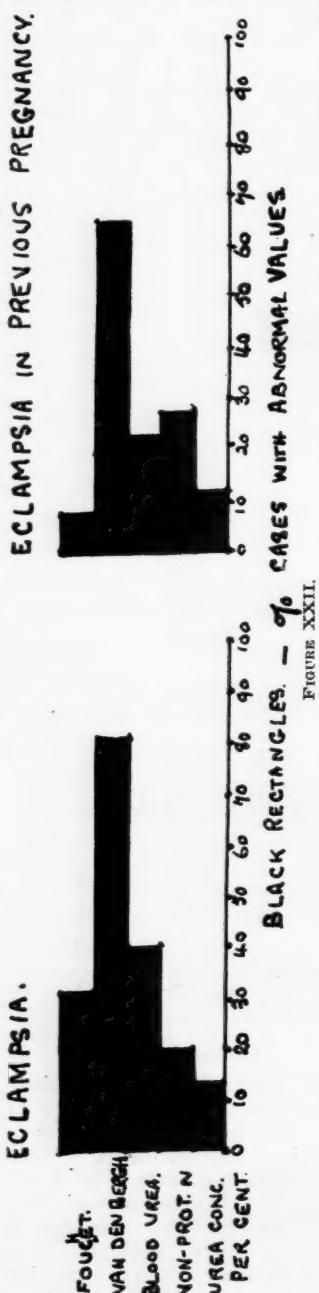
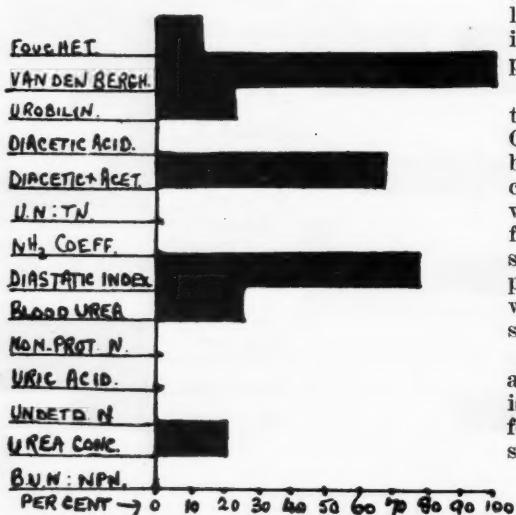


FIGURE XXII.



BLACK RECTANGLES - % CASES WITH ABNORMAL VALUES.



FIGURE XXIV.

The experimental work of F. W. Browne suggesting an underlying nephritic factor is certainly not explained.

In addition four patients on whom a Cæsarean section had been done for extreme concealed haemorrhage were found to be perfectly healthy a considerable time later. A pre-existing nephritis would presumably persist.

The management of accidental haemorrhage is obviously not affected by chemical considerations.

CLINICAL VALUE OF INDIVIDUAL TESTS.

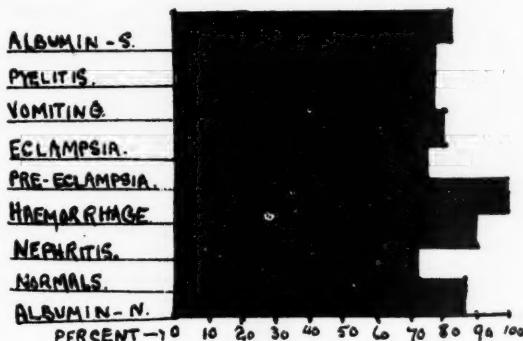
In analysing the value of the biochemical tests there are two aspects to consider, the purely academic and the practical clinical application.

This may be illustrated by reference to the Van den Bergh and Fouchet tests.

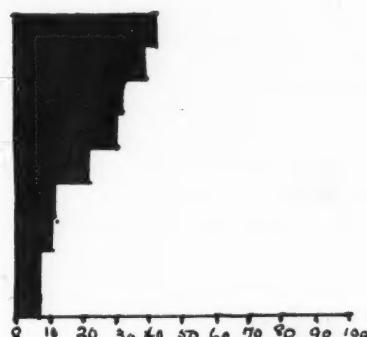
The general incidence of an indirect Van den Bergh reaction in patients with abnormal conditions

is much more a function of the toxic condition *per se*, appearing chiefly in vomiting, pyelitis, hepatic types, pre-eclampsia and eclampsia itself, but much more rarely in the nephritic types. It has, therefore, a differentiation value. Further, although we cannot prove a direct connexion between apparent clinical severity and the response to the Fouchet test, the presence of a reaction in a

VAN DEN BERGH.



FOUCHET.



BLACK RECTANGLES - % CASES WITH POSITIVE TESTS.

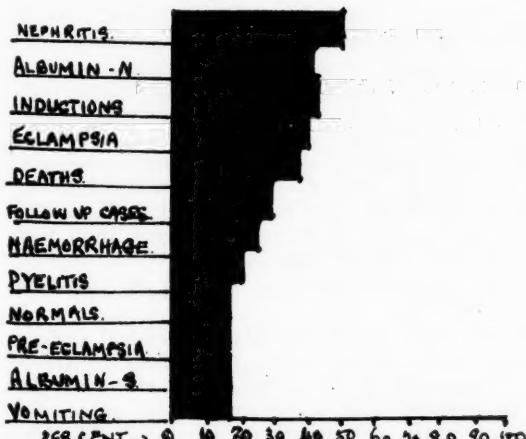
FIGURE XXIV.

is about 70% compared with 30% for normal patients. This is obviously interesting from the aetiological point of view, but its general distribution robs it of any value in differentiation and treatment. Its related Fouchet reaction, however,

doubtful case may be a determining factor in treatment.

The laevulose test is interesting aetiologically, but at present its exact value cannot be assessed.

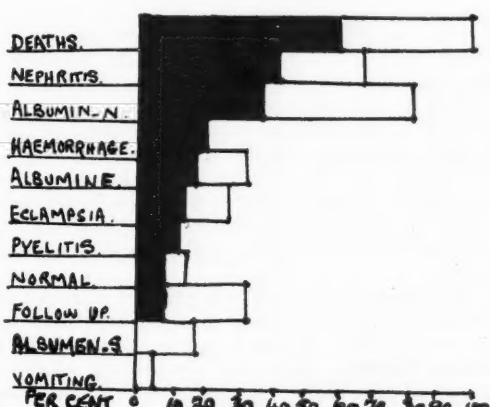
BLOOD UREA.



BLACK RECTANGLES - % CASES WITH B.U. > 60 mg%.

FIGURE XXV.

UREA CONCENTRATION.



BLACK RECTANGLES - % CASES WITH UC < 1.5%

COMPLETE " - % " " UC < 2%

FIGURE XXVI.

There is some relation of the pure toxic factor to diacetic acid in the urine, but there is no apparent relation, even quantitatively, to the severity of the condition. The ammonia coefficient has no useful significance even in a negative sense. Urobilin in the urine has a variable incidence and its appearance is not necessarily sinister. The high values of the diastatic index met with by de Wesselow have not appeared in our series. The low values (like the indirect Van den Bergh reaction) appeared very frequently in all groups, though more frequently than in the normal group. The low value is probably most significant in connexion with a low urea concentration. The claim of Mackenzie Wallis⁽¹¹⁾ that the diastatic estimation in the urine is the most reliable test in toxæmias of pregnancy is not confirmed.

from the estimation of the undetermined nitrogen in the blood.

The urea concentration test is very significant. From the academic point of view it definitely differentiates those cases where kidney involvement is most pronounced, showing a much higher abnormality incidence in the nephritic types. We find also that it has a definite relation to treatment and prognosis.

Summarizing, we feel that while there is considerable interest attached to many of the tests employed, the most useful at present are the Fouchet, the blood urea and the urea concentration. In addition, when these tests reveal abnormal values or the case is apparently severe in spite of normal figures, it seems advisable to carry out further tests, notably

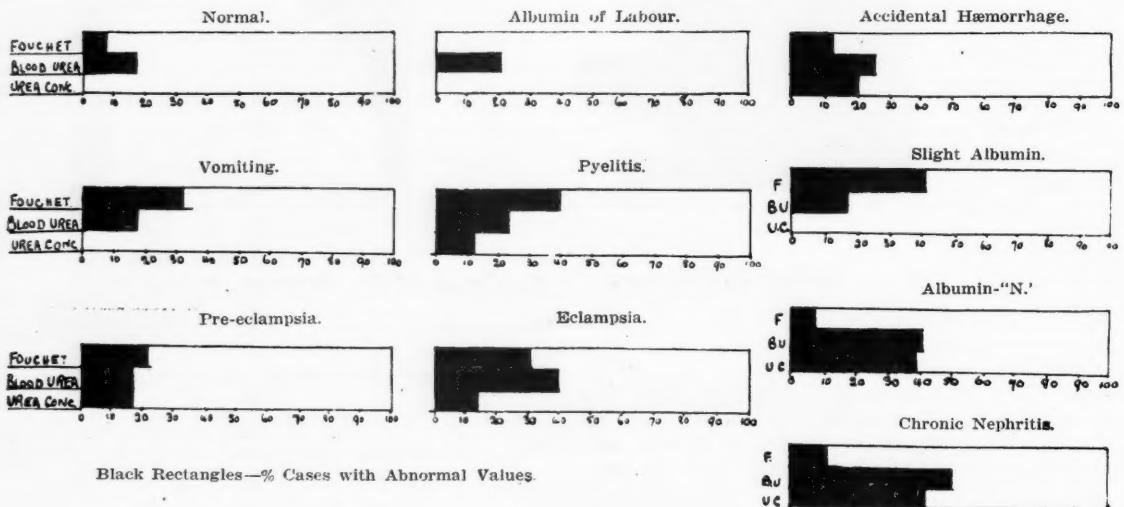


FIGURE XXVII.

On the renal side many analyses were made, but the blood urea determination and the urea concentration test prove the most useful.

As already mentioned the blood uric acid determination is disappointing as a refinement on the blood urea estimation. While there is a tendency to higher figures in the purely nephritic cases, the differentiation is much clearer with the blood urea test and much more assistance is given by it. Similar considerations apply to the blood creatinine estimation.

The determination of the non-protein nitrogen in the blood proved of little use in differentiation, but a high non-protein nitrogen figure is definitely a suspicious feature. Like the non-protein nitrogen the ratio of the blood urea nitrogen to the non-protein nitrogen provides no refinement on blood urea figures, although a high ratio is increasingly present as we pass from normal (15%) through pre-eclampsia (30%) and eclampsia (50%) to chronic nephritis (60%). The significance of the ratio is difficult to follow. No conclusions could be drawn

the non-protein nitrogen, diastatic index, diacetic acid and acetone and levulose tests.

Figure XXVII demonstrates the relationship of the different groups to the three most useful tests.

CLINICAL APPLICATION TO PROGNOSIS AND TREATMENT.

We have suggested that the composite character of any one case makes our clinical outlook incomplete if we do not use the chemical findings as a fine adjustment. Of more consequence than mere classification and aetiology is the fact that chemical findings have an important bearing on treatment and prognosis.

It has been stated that if the chemical findings conflict with clinical signs, it is wiser to act on the indications of the latter. This statement has to be received with a certain amount of caution. In other words, deference should be paid to chemical findings quite irrespective of case grouping.

The two factors can be correlated broadly by a discussion of four types of cases.

When the clinical signs are satisfactory and the chemical signs are satisfactory, there can be no dispute or difficulty.

CASE 14.—*A multipara*, second pregnancy in the eighth month. On June 9, 1926, there was oedema, headache and vomiting, the urine became solid with albumin on boiling. The blood pressure was 190 millimetres of mercury. The blood urea concentration was 39 milligrammes per hundred cubic centimetres of blood, the urea concentration was 2·6%, there was no reaction to the Fouchet test. There was a good response to treatment.

On June 18 she was delivered.

On July 13, she was well; there was no albumin in the urine. The blood pressure was 110 millimetres; the blood urea concentration was 42 milligrammes and the urea concentration 2·6%. There was no reaction to the Fouchet test.

In this case there was ready response to treatment and the chemical findings are satisfactory.

In the second class the clinical signs are unsatisfactory and the chemical signs are unsatisfactory. There should be no doubt as to the course of action, both clinical and chemical factors calling for induction of labour.

CASE 16.—*Multipara*, third pregnancy. In 1923 she had eclampsia and was treated by Cesarean section. In 1924 she had threatened eclampsia. Labour was induced. In her third pregnancy in 1926 at three and four months her urine contained a trace of albumin.

On September 14, 1926, at five months there was still albumin in the urine. The blood urea concentration was 52 milligrammes per hundred cubic centimetres of blood. The urea concentration was 1·6%.

On October 8 the urine was solid with albumin; she was drowsy and delirious; her blood pressure was 220 millimetres of mercury. Induction of labour was carried out.

On October 11 a still born babe was born, weighing 1,134 grammes (two and a half pounds). The blood urea concentration was 63 milligrammes. There was no reaction to the Fouchet test.

In this particular case the obvious was ignored and an attempt to reach viability nearly resulted in tragedy; four weeks later induction had to be performed and resulted in a small still born child.

In the third class the clinical signs are unsatisfactory and the chemical signs are satisfactory. In such a case our clinical instinct stands first.

CASE 142.—*Primipara*, in the eighth month. On August 3, 1926, she had oedema; the urine contained one-third albumin; her blood pressure was 160 millimetres of mercury. The blood urea concentration was 24 milligrammes per hundred cubic centimetres of blood. The urea concentration was 3·8%. There was no reaction to the Fouchet test.

On August 18 the blood urea concentration was 22 milligrammes. On August 23 there was still between one-quarter and one-half albumin. The patient was weak. Labour was induced.

On September 18 there was no albumin. Her blood pressure was 100 milligrammes.

In this case albumin persisted in the urine for three weeks in spite of treatment and the patient was becoming weaker.

Induction was rightly performed on clinical grounds.

In the fourth the clinical signs are satisfactory and the chemical signs are unsatisfactory.

CASE 15.—*Primipara*, in the sixth month. On June 9, 1926, her urine contained albumin and pus; her blood pressure was 100 millimetres of mercury; her temperature

was raised. The blood urea concentration was 16 milligrammes per hundred cubic centimetres of blood. The urea concentration was 0·9%.

On July 15 the urine contained one-tenth albumin. The blood pressure was 110 millimetres of mercury. There was no pyrexia. She was discharged at her own request in the eighth month.

In August she was very ill. She was delivered of a still born child. Her blood urea concentration was 222 milligrammes. There was no reaction to the Fouchet test. She died.

This patient was not acutely ill in the early stages nor on leaving hospital, but the low urea concentration apparently called for induction of labour.

In the first and second classes there is no difficulty; the patient's condition is obviously "all right" or "all wrong."

In the third class we defer to our clinical sense and induce on clinical grounds.

It is in the fourth class that we find the great value of these tests in relation to treatment.

No claim is made on behalf of normal chemical findings, but on the other hand abnormality is entitled to great respect. An apparently simple toxæmia with unsatisfactory chemical figures should be viewed with suspicion; and several of our cases have ended in tragedy when chemical findings have been repudiated.

The statement then regarding the "conflict of chemical findings and clinical signs" requires modification. Clinical judgement may ignore normal chemical findings but certainly not abnormal findings. The suggestion is not to carry on a pregnancy in conflict with clinical signs; rather it is felt that a pregnancy is often unnecessarily and dangerously carried on in conflict with chemical findings.

To carry on a pregnancy safely the condition should be both clinically and chemically satisfactory.

In actual practice it is not necessary to elaborate the unsatisfactory clinical side. Of the groups nephritic types are intrinsically more serious than preeclamptic and frank eclampsia more serious than either; while at the other extreme some go as far as to label hyperemesis as purely neurotic. Among the signs and symptoms we recollect very high blood pressure, persistent early and severe albuminuria, sudden oedema, severe eye symptoms and gastric symptoms.

Chemically unsatisfactory urea concentration values less than 1·5%, blood urea figures more than 40 to 50 milligrammes per hundred cubic centimetres of blood and a Fouchet reaction, singly, more definitely if in combination and with chief emphasis on the renal tests.

To a certain extent we may consider those other tests mentioned in the summary of the clinical value of the chemical tests.

Prognosis.

If the chemical findings are of assistance in guiding treatment; they are more so in assessing prognosis.

The old stand that a toxic condition infers some sort of immunity for a subsequent pregnancy is not tenable.

We find, for example, J. Harris⁽¹²⁾ stating that three out of twenty-three eclampsias manifested signs of chronic nephritis at the end of a year, that of thirty-eight patients in whom labour was induced for toxæmia, twenty-one had subsequent toxæmic pregnancies.

Stander and Peckham state that of all patients with toxæmia without convulsions, 10% have permanent kidney damage.

Our own experience is similar, although the figures about to be given must not be misinterpreted as implying the actual incidence of sequelæ, as a greater proportion of patients with unsatisfactory signs will return for observation.

Twenty of the patients have had eclampsia in previous pregnancies and the following list shows the present condition:

Normal	9	Non-pregnant	2
Pre-eclampsia	4	Normal pregnancies	7
Chronic nephritis	6	Deaths	2
Nephritic type	1	Induction of labour	4
Slight albumin	1		

The present condition of fourteen other patients who had toxæmia at a previous pregnancy, is as follows:

Normal	1	Deaths	1	
Pre-eclampsia	3			
Nephritis	7			
Nephritic type	1			
Pyelitis	1	Induction of labour		
Hepatic type	2			
Severe hyperemesis	2			

The figures show that once a patient is toxæmic, she is liable to further manifestations.

Very important is the fact that although in some conditions the purely toxic factor tends to perpetuate, there is a definite tendency for subsequent manifestations to be nephritic in type.

Two case summaries will serve to illustrate the various findings in such subsequent pregnancies.

The patient was a *multipara* in the third pregnancy. In her first labour she had eclampsia and Caesarean section was performed. In her second labour she again had eclampsia and the child was still born. The findings in the third pregnancy are given below.

Date.	Urea Concentration. %	Blood Urea. (Mgms. per 10 c.cm. of blood).	Response to Fouchet Test.
September 9, 1926	3.4	10	—
November 23, 1926	2.5	16	—
December 4, 1926	1.8	31	—
February 22, 1927 ¹		18	—
February 25, 1927 ²		18	—
February 28, 1927		29	Slight
March 1, 1927	2.8		

¹ One-eighth albumin in urine.

² Delivered.

This case, in spite of extremely bad past history, deviated from normal only very slightly on one

occasion. The figures after delivery are highly satisfactory.

CASE 164.—*Multipara* in her sixth pregnancy. This patient had had severe pre-eclampsia previously. At five months in March, 1926, there was a trace of albumin in the urine. The blood pressure was 170 millimetres of mercury. The urea concentration was 2.5% and the blood urea concentration was 32 milligrammes per hundred cubic centimetres of blood.

On June 14 there was one-half albumin in the urine. The blood pressure was 190 millimetres of mercury. The blood urea concentration was 20 milligrammes.

Labour was induced and the patient delivered.

On June 28 there was no albumin in the urine and her blood pressure was 170 millimetres.

On November 10, 1926, she was pregnant (about two months). She had albumin in her urine. The urea concentration was 1.6% and the blood urea concentration was 27 milligrammes. She was curetted.

On November 17 there was no albumin, the blood pressure was 170 millimetres and the urea concentration was 1.9%.

This patient apparently stood the strain of earlier pregnancies and one severe toxæmia, but a second attack left permanent kidney damage. The next pregnancy was immediately terminated, with some improvement in chemical findings.

Chemical findings have a very definite relation to prognosis and this is possibly more definite than the clinical relation.

While it is fairly safe to predict a recurrent toxæmia in a purely nephritic type of case, one cannot otherwise forecast a subsequent pregnancy.

On the other hand, quite irrespective of case grouping, if there are unsatisfactory chemical findings, although the immediate outlook may appear satisfactory, the ultimate outlook as to subsequent pregnancies is unsatisfactory.

The corollary of this statement also holds. In a patient with a past history of toxæmia (again quite irrespective of case grouping and no matter how successfully managed at the time) the appearance of unsatisfactory chemical findings makes even the immediate outlook unsatisfactory.

The converse of these statements may also hold and is proved in a limited way by Stander and Peckham with their conception of "low reserve kidney" type of case with only moderate albuminuria and chemically satisfactory signs. In such a patient the subsequent pregnancy is normal or she may have albumin in her urine and the results of the tests may be normal, a recurrent low reserve kidney.

It would seem that prognosis is determined by chemical rather than clinical factors.

At the present stage of our investigation further elaboration of the chemical side is impossible. As time goes on it is hoped that more of the patients originally investigated will come under observation again.

Given the opportunity, many suggestive aspects of the problem could then be more definitely worked out.

The accompanying table is suggested tentatively as a guide to prognosis in existing toxæmia.

Previous Toxæmic History.	Present Chemical Findings.	Prognosis.	
		Present Pregnancy.	Subsequent Pregnancy.
None	Good	Good	Good
	Bad	Clinical Decision	Bad (probably)
Good	Bad		Good
	Good Bad	Good Bad	Good Bad

By good history we mean pregnancy proceeded satisfactorily or the toxæmia was only of mild type.

SUMMARY.

1. Chemical investigation of the toxæmias of pregnancy has a very distinct academic interest.

2. From the aetiological point of view every toxæmic condition independently of grouping has potentially three factors: (i) purely toxic (probably hepatic), (ii) renal, (iii) pre-existing nephritis.

3. The most satisfactory grouping is a clinical one and an elaboration of types is unnecessary and confusing.

4. The pure clinical outlook is incomplete. Each case should be viewed broadly according to its grouping with the chemical findings as a fine adjustment.

5. For practical purposes renal impairment is more significant than hepatic. The most valuable tests are the urea concentration test, the blood urea test and the Fouchet test.

6. In treatment of a "new case" chemical findings may be overweighed by clinical judgement. Where there is a bad past history much more deference must be paid to chemical findings.

7. From the point of view of subsequent history and pregnancy, defective renal tests are very sinister. This is a consideration in immediate treatment.

Acknowledgements.

In conclusion our thanks are due to the Obstetrical Research Committee, Edward Wilson (*The Argus*) Fund for the grant which enabled the investigation to be carried out. We wish to acknowledge the work of Dr. C. H. Mollison prior to the commencement of this investigation. Tests performed by him made possible a very complete chemical history of some of our patients.

We wish also to thank Dr. Bearham, Dr. Heyward and Dr. Yoffa, of the Women's Hospital, for their assistance in arranging for satisfactory samples and in advising suitable patients.

Finally, it would have been impossible to carry out the work without the facilities of the Biochemistry Department of the University of Melbourne, where the analytical work was carried out by one of us. The help and cooperation of Dr. W. J. Young, Associate Professor of Biochemistry, have not been the least of these facilities.

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IMMUNIZATION AGAINST DIPHTHERIA AT THE STATE SCHOOL, KINGAROY, QUEENSLAND.

By E. KENT HUGHES, M.B., B.S. (Melbourne),
Armidale, New South Wales.

THE subject of immunization against diphtheria has been brought prominently before the public lately so I thought that some statistics concerning a small epidemic in a country school at Kingaroy, Queensland, would be of interest.

The parents of the school children were circularized by the Shire Council in October, 1927, and when signed permission was given, the children were immunized in November and December. Some had been treated privately. About 75% of the parents gave permission to have their children immunized, although as the epidemic occurred the following April, there were more untreated than treated children in the school owing to the big change in personnel at the end of the year. No ill results were noted during the process except that one boy reported that he had an attack of nausea the following day which might have been due, of course, to overeating. Two children fainted before they received their injection and one fainted afterwards. Mr. Egan, the headmaster of the school, kindly permitted Miss Beryl Larsen to compile statistics for me from the school roll for April. She took a great deal of trouble to produce an accurate result. The township had been free from diphtheria for many months when this epidemic occurred. There were one hundred and sixty-eight immunized children, not one of whom contracted diphtheria. There were one hundred and ninety untreated children, eleven of whom contracted the disease. This gives a diphtheria evidence of 6% for unimmunized children as against none for those who were immunized. This shows that the procedure proved of great value in protecting children exposed to diphtheria from contracting the disease.

Reports of Cases.

A CASE OF APPENDICITIS WITH UNUSUAL FEATURES.

By H. NEWMAN MORTENSEN, M.B., B.S. (Melbourne),
AND
LORNA BRAY, M.B., B.S.,
Yarrawonga, Victoria.

MISS F., *atatis* twenty-four years, a nursemaid, consulted us complaining of abdominal pain and nausea of thirty-six hours' duration. Her history was that she was previously well until fourteen days before, when on lifting a basket of clothes she experienced severe pain which she referred to the right iliac fossa. She vomited and the pain, though easing off, persisted for three days and was succeeded by a soreness in the same region. Thirty-six hours prior to seeking advice she had experienced a kick in the abdomen from a child she was nursing, and shortly afterwards again noticed pain which gradually became worse; she vomited and was constipated. On examination she had a temperature of 38.3° C. (101° F.) and a pulse rate of 110 and the typical signs of acute appendicitis. At operation an interesting condition was discovered. The appendix was found twisted on itself causing an acute obstruction half way along its length, the distal half being gangrenous and lying in an abscess sac. The proximal half was tensely swollen and covered in lymph.

The sequence of events in all probability was that the lifting of the heavy object which was synchronous with the first attack of pain, caused a torsion of the appendix, its acute obstruction and the subsequent development of an abscess sac. The second injury, the kick from the child, was evidently the *fons et origo* of the second attack resulting in an acute inflammation of the wall of the proximal half of the appendix.

The case shows interest from many viewpoints:

1. The important part trauma is capable of playing in the aetiology of acute appendicitis. This point has been stressed by Barnard in his book "Contributions to Abdominal Surgery"; he states that in his opinion forcible contraction of the muscle of Lockwood in the root of the mesentery may cause damage to the appendix resulting in its torsion or in lowering its resistance to the pathogenic organisms normally present in the caecum.

2. The necessity for the recognition of this aetiological basis in cases which may fall under the Workers' Compensation Act.

3. The interesting demonstration of pathology of the two common types of acute appendicitis, obstructive and inflammatory, being exemplified in the one case.

Reviews.

THE MECHANISM OF THE ALIMENTARY CANAL.

THE medical profession owes a debt to Dr. W. C. Alvarez, of the Mayo Clinic, who has done so much to clarify knowledge of the mechanism of the alimentary canal in health and disease. In the second edition of his book, "The Mechanism of the Digestive Tract,"¹ he has consciously or unconsciously followed the plan of that masterpiece "The Principles of General Physiology," by the late W. M. Bayliss, in that he has added much of historic interest, with photographs of past and living workers in

the subject. The reader feels that he has met these men, from Beaumont's time to the present.

Alvarez has greatly elaborated his theory since it first appeared in *The Journal of the American Medical Association* on July 31, 1915, at page 388. Briefly he shows that the irritability, rhythmicity, contractility, peristalsis *et cetera* of the gastro-intestinal tract gradually diminish from stomach to ileo-caecal valve. This "gradient" depends upon a similar "gradient" of metabolic activity in the musculature of the tract and this in turn on a "gradient" in the blood supply. The contents of the tract always move from points of greater irritability and activity to points of lessened activity, that is, down the activity gradient. In disease, however, from nervous, toxic or other causes, this gradient may be altered. In parts it may actually be reversed, with the result that food may move in the reverse direction or the gradient may be flattened, with stasis of contents. On this theory he explains many of the common symptoms produced by gastro-intestinal function. Altogether his view is most attractive. The book is largely an account of the experiments and observations on which the theory is based, with some close reasoning. It should be read by all physicians and surgeons, not only because it gives a clear understanding of the principles underlying symptomatology, diagnosis and treatment, but as a basis for gastro-intestinal surgery.

We are pleased to note that, unlike many American authors, Alvarez does full justice to British and Continental workers as well as to American observers. The book has an excellent bibliography of over a thousand references, it is well printed and illustrated, on good paper and is interestingly written.

Analytical Department.

"VITA-WEAT" BISCUITS.

THE well-known firm of Peek, Frean and Company has placed on the Australian market a brand of whole wheat meal biscuits. The biscuits are contained in hermetically sealed tins and other containers. They are crisp, palatable and of good appearance. It is claimed that they contain a high protein and carbohydrate fraction and a low water constituent and that as they are made from whole wheat, they enclose a rich supply of vitamins A and B. At the present time there are no facilities for the estimation of the vitamin content of food preparations in Australia. We are informed that in the course of a few months a supply of suitable rats will be available. It is proposed to subject this brand of biscuit to an examination for the vitamin content as soon as this is practicable. The manufacturers publish in a small pamphlet the result of an analysis of "Vita-Weat" biscuits as follows:

Protein	11.46%
Carbohydrate	72.3%
Moisture	4.03%
Calories per pound ..	1,938

An analysis carried out for THE MEDICAL JOURNAL OF AUSTRALIA yielded the following figures:

Fat	7.60%
Protein	11.52%
Carbohydrate	72.72%
Fibre	1.71%
Ash	1.25%
Nitrogen	1.82%
Moisture	5.20%

The weight of each biscuit averages ten grammes. From the fact that the figures obtained on analysis correspond closely with those given by the manufacturers and because of the low ash and fibre content, it is safe to assume that this biscuit is a nutritious and wholesome article of diet. It appears to be prepared with care. In the pamphlet accompanying the biscuits there is a misstatement concerning the comparative composition of ordinary white bread. The figure for moisture is too high and those for protein and carbohydrate are too low. This matter, however, is of small importance and does not affect the value of "Vita-Weat" biscuits.

¹ "The Mechanics of the Digestive Tract: An Introduction to Gastroenterology," by Walter C. Alvarez, M.D.; Second Edition; 1928. Paul B. Hoeber, Incorporated. Royal 8vo., pp. 467, with illustrations. Price: \$7.50 net.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 15, 1928.

The Pathology of the Future.

ONE of the greatest obstacles to progress in science arises from the universal tenet that special words must be employed for particular purposes. At times a word is chosen to express a conception and when this conception has to be modified as a result of the acquisition of new knowledge, the same word is retained. It is not surprising if the new conception is not fully understood, because of the old label. The term physiology, meaning the science of life, was satisfactory as long as it was believed that function depended on structure. But since it has been recognized that the function of an organ is determined partly by biochemical changes, some of which have their origin in distant tissues, partly by biophysical phenomena and partly by biological qualities, inherited or innate, it becomes apparent that the word physiology is ill chosen to convey the impression of the complex interactions and incidents that result in function. Similarly the word pathology no longer connotes the modern idea of the nature of disease. Formerly the term was used in the sense of the histological changes encountered in tissues and cells and the consequent alteration of function. Today the nature of disease is held to be governed by modifications of the biochemistry, biophysics and biology of cells, tissues and organs and at times of the whole body. The morbid anatomist sees certain changes in the diseased organ and endeavours to correlate these changes with the clinical manifestations of the disease. The pathogenesis of the process is rarely revealed in this way. But even if the histologist goes a step further and summons microchemistry to his aid, the most he can hope for is the elucidation of the condition as it exists in the diseased organ; he cannot trace it back to its earliest beginnings nor can he fathom the interactions between the

other presumably unaffected organs and tissues and the organs and tissues that are obviously affected. Unfortunately for the human race the nature of even the simplest disease seems to be extremely complicated. When bacteriology was first accepted as a science, it was thought that the invasion of the body by a causative bacterium sufficed to produce a definite disease. Later it was discovered that that elusive quality, resistance, had to be taken into account. Still later it was found that the cells and tissues of a susceptible host varied considerably in their reaction to a pathogenic bacterium and to its chemical products. An infective disease is caused by a living virus, but it may be altered, modified and transmuted by other bacteria and by bacteriophages. Its manifestations may depend on some interference with the normal metabolism; some of the signs and symptoms may be produced by the remote effect of some inhibitory substance or by the disturbance of a nicely balanced normal reaction. In recent years pathologists have learned to rely less on what has been regarded as the obvious cause, be it a bacterium or some external influence, and more on the essential modification of the chemical adjustment of the tissues and tissue fluids.

Pathogenesis seems to have arrived at a stage when a simple explanation of a disease provides the main thesis. The iodine deficiency of exophthalmic goitre, the insulin defect of *diabetes mellitus*, the presence of *Spirocheta pallida* in syphilis, the septic infection in osteomyelitis may be mentioned as easily explained facts that are regarded as the essence of the corresponding disorders. A study of the development, course and termination of these and other diseases reveals that the process is highly complicated and that the simple facts represent but one portion of the story. There is a great deal of evidence in favour of the view that typical diseases vary so much in their manifestations in different individuals, that the character of the departures from normal functioning of organs and tissues of the body must share the same variation. It is wise to pay greater heed to the abnormal reactions of the tissues and organs in individual patients than to the main lesions to which the names of the diseases have been given. If this conception be correct, it will follow that in the future an understanding of

a disease process will entail the close study of the biological, chemical and physical fluctuations of the body. The aetiological agent will be recognized as the ultimate cause; from that cause the changes in structure and in function will have to be traced until a new equilibrium, the equilibrium of the disease state, will have to be discovered and defined. It is not sufficient to determine that a bacterium or a protozoon has gained an entrance into the body. Pathology in the future will have to ascertain the biochemical nature of natural immunity, the failure of which enables the virus of a disease to establish itself within the human body. This phase of pathogenesis is the most important, for by combating this failure the disease may be prevented. Then must come the investigation of the primary reaction between the virus and the tissues, the elaboration of abnormal products that start the changes in the metabolism which manifest themselves as signs and symptoms. It is obviously insufficient to select one prominent chemical change, even if this be an essential aetiological element, and to leave the secondary reactions unexplored. New methods will be required to fathom many of the reactions of the living organism, but until these methods have been evolved, it will be vain to assume that the nature of a disease is fully understood. Wide views are necessary if pathology is to emerge from the blinker stage of the histological examination of the obviously affected organ. Attention must be given to every tissue and fluid of the body and there must be a constant reference to those chemical and physical changes which constitute normal function.

Current Comment.

GLYCOSURIA AND HYPERTHYREOIDISM.

It is well known that in hyperthyreoidism and hypothyreoidism there is a disturbance of the carbohydrate metabolism and spontaneous glycosuria has often been noted in Graves's disease. It has also been shown that the administration of small quantities of carbohydrate in this condition may cause a temporary glycosuria. This reduction of carbohydrate tolerance in over-activity of the thyroid gland has been the subject of several contributions to literature. Among those who have recently written on this subject is Wilder. He found

that diabetes was present in about 1·1% of all patients with hyperthyreoidism. Exophthalmic goitre in his opinion is complicated less frequently by diabetes than adenomatous goitre; the percentage of the former in his series was 0·6 and of the latter 2·0. The symptoms of hyperthyreoidism in a patient with diabetes may be obscured by symptoms of the latter condition, especially if severe acidosis or coma be present. Hyperthyreoidism, on the other hand, may cause an increase in the symptoms of a mild diabetes and if the hyperthyreoidism be severe, it may readily induce coma.

E. P. Joslin and F. H. Lahey have recently discussed the question of diabetes and hyperthyreoidism and have given some figures which are of interest from several points of view.¹ Their paper is based on the histories of seventy-five patients suffering from diabetes who were found in a study of patients coming for treatment for diabetes and of those coming for treatment for thyroid disease. In the former of these two groups there were 5,790 of whom 4,917 were true diabetics, and in the latter group there were 5,908 of whom 3,869 were operated on for thyroid disease. Of the 3,869 patients 1,751 suffered from primary hyperthyreoidism and 655 from secondary hyperthyreoidism. Of the 75 patients 43 suffered from primary hyperthyreoidism (exophthalmic goitre), 28 from secondary hyperthyreoidism with adenomatous goitre and four suffered from hyperthyreoidism the cause of which was unknown. The total number, 75, represented a percentage of 1·5 of the total cases of true diabetes. The standard adopted for the diagnosis of diabetes in hyperthyreoidism was a blood sugar level of 0·15% while the patient was fasting or 0·20% or more after meals in addition to the presence of glycosuria. This somewhat raised standard was adopted in order that premature diabetic cures might be avoided. A comparison is made between patients with thyroid disease and those admitted to hospital as a routine for the treatment of conditions requiring surgical operation. The conclusion is arrived at that diabetes is twice as frequent in the former group as in the latter.

The first conclusion of importance is that hyperthyreoidism is the fundamental factor in disease of the thyroid which leads to glycosuria. This is held to be evident from an analysis of 500 cases of disease of the thyroid. In 38·6% of 228 cases of primary hyperthyreoidism there was 0·1% or more of sugar in the urine before operation or 0·5% or more after operation; in 27·7% of 83 cases of adenomatous goitre the same percentage was present; but in 189 cases of non-toxic goitre this percentage of sugar was present in only 14·8%. The last named figure is practically identical with that found among five hundred successive patients admitted for conditions requiring surgical treatment.

Considerations such as these open up the whole question of the physiology of the relationship of the thyroid and the pancreas. Joslin and Lahey point

¹ *The American Journal of the Medical Sciences*, July, 1928.

out that in regard to this question there is certain experimental evidence to be considered. Feeding the thyreoid gland to normal animals has in certain instances resulted in the lowering of the assimilation of glucose and according to Cramer in a decrease in the quantity of glycogen stored in the liver. Conversely thyroideectomy in normal animals increases the tolerance for carbohydrates and leads to hypoglycæmia. Burn and Marks and Bodansky have found that either by the feeding of thyreoid gland or by injections of thyreoid substance the liver is made hypersensitive (over-responsive) for the discharge of its sugar as a result of some stimulation which favours the conversion of glycogen into sugar. Insulin is subservient to the thyreoid, but only as long as the thyreoid keeps intact a store of glycogen in the liver. In disease of the thyreoid gland glycosuria and hyperglycæmia are neither casual phenomena nor dependent alone upon the increased metabolism of hyperthyroidism. There is a certain relation between the thyreoid and the pancreas through glycogen storage just as there is between the pituitary and pancreas. Hyperglycæmia and diabetes are not so frequently associated with hyperthyroidism as they are with disease of the anterior part of the pituitary and hypoglycæmia and the non-diabetic state are not so definitely associated with hypothyroidism as these conditions are with the posterior part of the pituitary, but the similarity of the relation of the two glands to the pancreas is too definite to be overlooked. Joslin and Lahey add that it is hardly possible to fail to reach the conclusions that if the diabetic *Anlage* were present only to a slight degree in a patient, hyperthyroidism would bring diabetes to the fore.

A great deal will depend on the changes which take place in the islands of Langerhans as a result of thyreoid disorder. Joslin and Lahey point out that definite anatomical changes in the pancreas are said to result from the administration of thyreoid tissue. Kojima and Hoshimoto reported hypertrophy of the pancreas after thyreoid feeding. Other writers have reported hypertrophy of the islands of Langerhans following thyroideectomy; Naunyn held that those observations required confirmation. Pettavel is regarded as having furnished ground for the observation that in some, but not in all cases of Graves's disease there are more or less clear pathological anatomical changes in the pancreas. Klose reported hypertrophy of the islands of Langerhans in myxœdema and added that it may well be that the lesser changes of carbohydrate metabolism of thyreoid origin result only in functional changes in the islands of Langerhans, whereas the severe lesions leave a final imprint upon the anatomy of the pancreatic islands. Joslin and Lahey think that the results of treatment of glycosuria in thyreoid disease can be interpreted on this hypothesis.

Consideration of the conclusion that the hyperthyroidism is the fundamental factor which leads to glycosuria, opens up the question of the distinc-

tion between glycosuria and diabetes. If the hyperthyroidism is the factor which leads to glycosuria, it must be concluded that it is the excess of thyreoid secretion which leads to the pathological changes in the islands of Langerhans. In these circumstances it would be expected that the occurrence of glycosuria would be much more frequent among persons with hyperthyroidism than it is. It is much more likely that the hyperthyroidism and the susceptibility of the island cells to damage have some common antecedent factor. There will undoubtedly be an early stage in diabetes at which the injury to the islands has not become extensive and at which recovery may occur without resulting permanent and obvious pathological change. Even after actual diabetes has become manifest, treatment of the thyreoid condition will result in a lessening of the diabetic manifestations. Joslin and Lahey show this quite clearly in their report. They state that they know that their seventy-five patients have not been cured of their diabetes after successful operation on their thyroids, but that most of them have been improved to an unusual degree. The thyreoid condition has also, of course, not been cured.

Another point which needs emphasis and which is evident after reading this article, is care in the use of the word diabetes. Glycosuria is not diabetes. Joslin and Lahey state that removal of $\frac{10}{20}$ of the pancreas is a gross method of producing diabetes. This is not so. Glycosuria resulting from pancreatectomy is not identical with diabetes. Antecedent factors including that postulated for the occurrence of hyperthyroidism and glycosuria are lacking.

Finally, from the preventive aspect it must be recognized that persons with hyperthyroidism are more liable to be affected by glycosuria and subsequent diabetes and should be watched from this as well as from other points of view.

COURVOISIER'S LAW.

COURVOISIER, a French surgeon, who died in 1918, made certain observations which have since been described as Courvoisier's law. He said that tumours of the head of the pancreas almost invariably cause dilatation of the gall bladder; he also held that in most cases of obstruction of the common bile duct by gall stones the gall bladder is contracted, it is dilated when obstruction is due to other causes. E. T. Clifton has reported a case which was an exception to this so-called law.¹ The patient, a woman of forty-six, suffered from a condition regarded as due to stone in the common bile duct, the gall bladder was distended. At operation gall stones were found in the gall bladder and the head of the pancreas was hard and irregular. Chronic pancreatitis was present and not malignant disease which was suggested by the microscopical appearances. The patient made a complete recovery.

¹ Guy's Hospital Reports, July, 1928.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Gastric Secretion and Other Digestive Factors in Rosacea.

S. R. EASTWOOD (*The British Journal of Dermatology and Syphilis*, March, 1928) reports the investigation of sixty-three cases of rosacea. He calls attention to the ophthalmic lesions which often pass unrecognized and which may take the form of a superficial vascular keratitis leading up to corneal ulceration. The following facts were noted: (i) Fractional test meals were given to fifty patients with rosacea; low secretory curves were found in about half of them. (ii) Hydrochloric acid had a beneficial effect in treatment in a greater number of patients than was accounted for by the low curves. (iii) Some digestive disturbance was found in 84% of patients whose condition was fully studied. Whatever the type of disturbance, its effective relief was accompanied by relief of the rosacea. (iv) Carbohydrate excess in diet is a fairly constant finding. (v) Blood pressure was found to be lower than normal. (vi) Focal sepsis was sometimes a factor in maintaining the rosacea.

Dangerous Skin Diseases.

L. KUMER (*Wiener Medizinische Wochenschrift*, May 12, 1928) discusses the diagnosis and treatment of various skin lesions which frequently prove fatal. Burns and scalds form the largest group. The prognosis is bad if 10% of the body surface is implicated and very serious if at least 20% is involved. The grade of burn may not be determined for several days, as a second degree burn may slough and become one of more serious importance. It is essential to watch the pulse as an indication of cardiac failure. The urine should be tested and any tendency to oliguria or anuria noted. Unfavourable symptoms are hiccup, yawning, clonic spasms and Cheyne Stokes's respirations. Blood transfusion and rectal injections of saline solution are very useful in treatment. "Lysol" poisoning also causes cutaneous lesions, but fatal results are generally due to renal intoxication. *Pemphigus foliaceus* and *vegetans* may cause death. Eosinophilia and diminution of chlorides in the urine are important diagnostic points. For treatment arsenic, quinine, "Salvarsan" and calcium are useful, while X ray treatment is to be preferred for *pemphigus vegetans*. Acute *lupus erythematosus* is a very fatal condition. It may be generalized or localized and is often associated with erysipelas. Occasionally venesection and saline infusions with injections of "Argochrome" may prove successful. Noma is a rare skin lesion, but very fatal. "Salvarsan" is used with local applications of iodofrom and hydrogen peroxide. Other lesions of serious importance are

mycosis fungoides, anthrax, *dermatitis exfoliativa*, "Salvarsan" dermatitis and occasionally furunculosis. Squamous epithelioma, secondary lupus, carcinoma and above all melanotic sarcoma are all lethal skin tumours.

Certain Volatile Oils and Stearoptens as Fungicides.

L. B. KINGERY AND A. ADKISSON (*Archives of Dermatology and Syphilology*, April, 1928) remark upon the few chemotherapeutic investigations that have been undertaken in connexion with the pathological moulds and fungi. Following upon the study of an occupational dermato-mycosis known locally as "fruit poisoning," they decided to go into the whole question of fungicides. Approximately forty organisms were used at the start, the number being reduced later to twenty, the more highly susceptible being excluded. The drugs used included certain old established ones such as sulphur, salicylic acid, benzoic acid together with the aqueous solutions of a number of oils such as thymol, cinnamon, cloves, peppermint. Many dilutions of each drug were made and varying times were allowed before subcultures were made. The two methods of study employed by Schamberg and Kolner were used first to find the strength of a medicament necessary to kill cultures of the organisms, secondly to attempt to determine the dilution of the drug necessary to inhibit their growth in a medium. The conclusions drawn from the tabulated experiments would suggest, *in vitro* at least, that the aqueous solutions of thymol, cinnamon, clove *et cetera* were far superior both in killing the fungi and restraining their growth than were the drugs commonly used for this purpose on the human subject. The possible objection due to their known irritative qualities would seem to be eliminated by the fact that aqueous solutions alone were used.

Idiopathic Trichoclasis of Jackson-Sabouraud.

A. E. MARCOGLIOU (*Archives of Dermatology and Syphilology*, April, 1928) states that both Jackson and Sabouraud described simultaneously cases of trichoclasis and trichorrhesis which occurred in localized circumscribed patches. The writer describes an additional instance in a student, aged twenty-six years. A rounded patch about six cubic centimetres in diameter was situated in the middle of the right area, the hair on it ranging from 1.5 to two centimetres in length, much shorter than the surrounding hair. Several small grey nodosities were seen on the shorter hairs and the skin underneath was dry and rough. Microscopically trichoclasis, trichorrhesis and trichotilliosis were present. The patch cleared up under ultra-violet light, but recurred a year later. The patient was healthy and this was against a trophic origin. No fungus was present. It is suggested that a close relationship exists between this type and neurodermite.

Colloidal Gold, Colloidal Mastic and Colloidal Benzoin Tests for Cerebro-Spinal Fluid.

C. E. RAYNER (*Archives of Dermatology and Syphilology*, June, 1928) gives an analysis of the results obtained by the application of the colloidal gold, mastic and benzoin tests in two hundred and fifty specimens of spinal fluid. The mastic and gold tests agree in 91.6% of the specimens, the gold and benzoin tests in 79% and the benzoin and mastic tests in 81%. The colloidal benzoin test is the most sensitive of the three tests and apparently is the first to reveal abnormalities in the spinal fluid which may be of use in the early detection of involvement of the central nervous system in syphilis. The benzoin test is more valuable than the mastic test, because it may make possible the differentiation of certain pathological conditions such as meningitis, general paralysis and tabes. The mastic test is a good test to use in determining whether there is any abnormality in the spinal fluid, but it does not afford any idea of the nature of the involvement. A good arrangement would be to carry out both the gold and benzoin tests on each specimen of spinal fluid in order to obtain the greatest amount of information.

Microchemical Studies of Arsenic in Arsenical Dermatitis.

E. D. OSBORNE (*Archives of Dermatology and Syphilology*, July, 1928) refers to a previous paper on arsenical dermatitis which he presented two years ago. In this paper the results of a study of arsenical keratoses and pigmentation are given. Two slight changes were made in the method used. Instead of incubating the pieces of tissue at 70° to 80° C. for four days, a temperature of 56° C. was found to be sufficient, if the tissue were cut into small pieces. Considerable staining power was retained and haemalum instead of haematoxylin was the stain used. In the earlier paper the observations were made on patients who had received quintavalent arsenic preparations such as Fowler's and Donovan's solutions. The present observations were made on patients suffering from a dermatitis following the administration of arsphenamine. The bulk of the arsenic was found to be deposited deep in the corium around the arterioles and capillaries, in the walls and lumen of the sweat and sebaceous glands and their ducts, in the hair follicles and in the hair shafts. The epidermis and subpapillary layers were almost free of arsenic. Previously when quintavalent preparations were used, the opposite was the case. Biopsies were made both before and after the administration of sodium thiosulphate and a remarkable diminution of the arsenic was noticeable. One gramme of the drug was given every day for six days. By means of hundreds of sections an attempt was also made to determine the relationship of the arsenic to the cell. As far as could be judged it was all intercellular. The affinity of quintavalent arsenical drugs for ecto-

dermal structures is responsible for the pigmentation, keratoses, mild dermatoses, wrist drop and optic atrophy, whereas trivalent arsenical drugs produce severe dermatitis, haemorrhagic encephalitis and purpura.

UROLOGY.

Pyelitis of Pregnancy.

B. C. CORBUS AND W. C. DAMFORTH (*Journal of Urology*, November, 1927) report on the state of the ureter and renal calyces, as observed in pyelo-ureterograms made at varying periods after pregnancies which have been complicated by pyelitis. The infection does not always disappear after the pregnancy is over and the results in this series of cases indicate that pyelographic study is demanded at a reasonable interval after pregnancy. In thirteen consecutive patients studied, the pyelo-ureterograms disclosed pathological conditions, usually in the form of kinks or strictures of the ureter, with dilatation and even tortuosity of the canal above the obstruction. Dilatation of the ureter with catheters will help to effect a cure even in the advanced forms of the condition. During the course of the pregnancy itself the pyelitis is best treated by passing up to the pelvis a Number 5 or Number 6 ureteric catheter, well lubricated and leaving it *in situ* for four or five days. The renal pelvis is irrigated with normal saline solution until the returning fluid is clear; this insures that the catheter will drain well. This gentle irrigation should be repeated several times a day. No antiseptic solutions should be used and no force should be employed in passing the catheter.

Carcinoma of the Prostate and Bladder.

B. S. BARRINGER (*The New England Journal of Medicine*, March 8, 1928) emphasizes the futility of treatment in most cases of carcinoma of the prostate. To illustrate this he has classified the results of the treatment of two hundred and two consecutive patients of his own as regards the duration of life after examination and treatment. Of the two hundred and two patients, only eighteen were not completely followed. After three years only fifteen patients were alive and in thirteen of these the carcinoma had extended well beyond the prostate. After four years only six patients were alive and after seven years only three. From these results the author concludes that patients with extensive carcinoma of the prostate should never be subjected to major surgical operations. He performs a modified punch operation when relief of obstruction is needed. He believes that between 5% and 10% of all patients can be apparently cured by radium, but the use of the latter should be preceded by one application of deep X-ray therapy to discover whether the carcinoma is radiosensitive. If any major operation is

attempted, it should be followed by persistent radiation of the prostatic bed and of the lymphatics around the seminal vesicles. Turning to bladder cancer, the author sees some justification for relative optimism. He treated twenty patients with papillary carcinoma and of these five have remained cancer-free for about five years. There were fifty-one patients with infiltrating carcinoma, eighteen of whom still remain apparently cured after about five years. A quick-heating electric cautery is used to burn down all protruding parts of the tumour when exposed at suprapubic operation and then gold tubes of radium of two millicuries strength, are implanted throughout the base of the growth at intervals of 1.5 centimetres. The gold tubes are removed after a certain number of hours. In ninety-four suprapubic implantations of radium the operative mortality was only 3%. When this is compared with the mortality of about 15% accompanying surgical removal of the growth, it must be realized that, even if removal by radium is not more effective, many lives can be saved by its employment.

Polycystic Kidney Disease.

R. E. CUMMINGS (*Journal of Urology*, February, 1928) has made a study of polycystic kidney disease. He states that when the human polycystic kidney is compared with the normal kidney of the codfish, distinct similarities are found. It can therefore be assumed that the generally accepted theory that cyst formation is due to developmental defects, is amplified, since there is halting at the mesonephric stage. While theoretically evacuation of cysts to lessen intrarenal pressure and nephrotomy for drainage of an associated pyonephrosis seem of value, their practical application is not satisfactory. Simpler measures, such as pelvic lavage and catheter drainage, are of decided value, as they help to control haemorrhage and infection. Nephrectomy is only rarely of value, being in fact usually fatal; it is often performed in ignorance of the actual pathological condition.

Treatment of Persistent Priapism.

R. W. MCKAY AND J. A. C. COLSTON (*Journal of Urology*, February, 1928) have added three cases of persistent priapism to the literature on the subject and they propose a new method of treatment. The immediate relief of the patient's symptoms is brought about by evacuating the blood clot from the *corpora cavernosa penis*. This has usually been done by incision, but the authors have used simple aspiration by needle and syringe. The needle (size 8 Luer) is thrust into one *corpus cavernosum* and the clot is aspirated with a twenty cubic centimetre Luer syringe. The *corpora cavernosa* are then washed out with normal saline solution. When the venous return is re-established the saline solution will gradually flow into the blood stream and no longer cause the penis to become erect; indeed a blood transfusion may be given to patients by this route. If the priapism returns,

its recurrence is very slow and the erection is only partial. However, there is no contraindication to the repeated use of aspiration. The aspiration method causes much less trauma to the neuro-muscular mechanism producing erection than do more radical surgical measures.

Cystalgia with Clear Urine.

G. MARION AND R. DALSACE (*Journal d'Urologie*, January, 1928) have studied the condition occurring chiefly in women whose distressing bladder symptoms are accompanied by the passing of urine which is clear to the naked eye. It is maintained that though such urine contains no demonstrable pus, examination on the slide and more particularly on culture will reveal bacteria of the *Bacillus coli* or staphylococcus type. In six months the authors collected thirty-five women whose urine was quite clear to the eye, though painless and sometimes painful frequency was present. Often the symptom of urgency was present and on this account involuntary escape of urine often occurred. As a rule the frequency was greater by day. In a certain proportion lesions in the uterus and adnexa were present and recent operations in the pelvis were considered as probable causes of the bladder symptoms. The best treatment was found to be lavage and not instillation. The best drug for lavage was oxycyanide of mercury.

Intractable Vesical Tuberculosis.

J. K. ORMOND (*Journal of Urology*, February, 1928) advocates inguinal ureterostomy as the best and most convenient method of relieving the distressing bladder pain and frequency found in vesical tuberculosis; this relief is due to the deviation of the urinary flow. Intractable vesical tuberculosis is seen in: (i) bilateral renal tuberculosis, (ii) tuberculosis of a remaining kidney, the opposite organ having been already removed for tuberculosis, (iii) rarely in a deeply involved bladder which fails to heal after nephrectomy, even though the other kidney is healthy and (iv) also rarely in advanced genital tuberculosis in males. If local treatment and hygienic measures fail to effect a cure, then unilateral or bilateral deviation of the urine becomes necessary. Lumbar nephrostomy is a safe operation, but sometimes fails to effect deviation of all the urine and should therefore give place to ureterostomy. The latter may be effected in the lumbar region, but here the apparatus and fistula are too inconveniently situated to be cared for properly by the patient himself. A suprapubic cystostomy is easily cared for, but will not surely relieve the symptoms. Cystectomy and bowel implantation of the ureters have too high a mortality to be advised as practical methods. Inguinal ureterostomy remains, then, as the most suitable method. The ureter is searched for near the bladder. Its free end is implanted in the wound in the inguinal region. A number 16 or 18 French catheter is worn in the ureter and this drains into a rubber bag worn on the thigh.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Sydney Hospital on July 12, 1928. The meeting took the form of a series of clinical demonstrations by members of the honorary staff.

Adeno-Carcinoma of the Colon.

DR. H. S. STACY showed a male patient, aged twenty-eight years, a marine steward and unmarried. He had been admitted to hospital on May 21, 1928. He had given no previous history of illness or operation, but had been a heavy consumer of alcohol and had smoked a great deal. For four or five months the patient had had trouble with his bowels. He had been in the habit of going to stool about three times a day, but would pass only a thin watery fluid and gas. This had become more pronounced until six weeks before admission, when pain appeared. The pain had occurred in the right iliac region anteriorly and had radiated across the hypogastrium to the left iliac region. It had been gripping in character, coming on in spasms and then easing off. It had had no relation to meals. There had been no history of vomiting and the appetite had been good. No loss of weight had been noticed. On examination the patient had had the appearance of a middle-aged man, moderately well nourished and of a good colour. The condition of his teeth had not been bad and his tongue had been clean and moist. The abdomen had moved freely with respiration. No rigidity had been found, but tenderness had been discovered in the right iliac region and to a slight extent in the left iliac region. The abdomen had been slightly obese, but no masses had been palpable. No abnormality had been discovered on rectal examination. The circulatory, respiratory, nervous and urinary systems had been clear.

On May 16, 1928, an X ray examination had been made and a report obtained to the effect that an enema produced a great deal of ballooning of the rectum and that only a very small amount could be forced into the sigmoid. The appearance seen on screening had been strongly suggestive of new growths and the remainder of the bowel had been enormously distended with gas. A sigmoidoscopic examination had been made and no abnormality detected. The patient had been put on colonic lavage. On May 25, 1928, another X ray examination had been made and no organic defect of stomach or duodenum had been discovered. The appendix had appeared greatly enlarged and segmented, the sigmoid loop had been high and an adhesive band had been discovered in the left iliac fossa. The patient had been relieved of diarrhoea by colonic lavage. He was still having some pain and complained of pain when a barium enema was given. The faeces had been examined; a few pus cells had been found, no red cells and no amoebae had been seen and no pathogenic organisms had been recovered. After a further X ray examination it had been reported that an enema filled and dilated the rectum, but that no opaque material flowed into the sigmoid colon. By comparison with a twenty-four hour meal examination a chronic obstruction, involving the lower portion of the sigmoid at the junction of its middle and lower thirds, had been diagnosed.

On June 5, 1928, operation had been performed under ether anaesthesia through an oblique left-sided muscle-splitting infraumbilical incision. The sigmoid had been exposed and a growth discovered in its lower portion. The growth had been the size of a small orange with a ring-like constriction around its middle. It had been quite mobile and several hard and large glands had been found in the adjoining mesentery. The bowel above the growth had been considerably dilated. About 12.5 centimetres (five inches) of sigmoid had been removed together with a wedge-shaped portion of the mesentery. The sections through the bowel had been made at an angle of 45°, as practised by Lockhart Mummery. End-to-end anastomosis had been performed and as the omentum was not long enough to be stretched around the anastomosis, a free omental graft had been employed. A small drainage tube

had been introduced through a stab wound in the left loin and placed behind the site of anastomosis in case of leakage. Caecostomy had been performed and a 1.25 centimetre (half inch) drainage tube brought out through a stab wound in the right iliac region. Convalescence had been uneventful. When the bowel was opened a large fungating mass had been discovered, but section had been made 2.5 centimetres (one inch) or so beyond the growth at either end. Dr. Keith Inglis had reported that the growth was an adeno-carcinoma and that the glands were not involved. The caecostomy tube had drained well after the first day or two and it had been removed in fourteen days. Liquid paraffin had been given to soften the faeces. Subsequent X ray examination had revealed a very slight stenosis at the pelvi-rectal junction.

Abdominal Adhesions.

Dr. Stacy's second patient was a male, aged forty-six years, who had complained of intermittent gastric troubles for fifteen years. He had had three laparotomy operations performed with only temporary relief; these operations had included gastro-enterostomy and appendicectomy. The patient had been admitted under Dr. Stacy's care in November, 1927, and his chief symptom had been constant gnawing pain and vomiting. Laparotomy on November 1, 1927, had revealed a gastro-enterostomy with a mass of adhesions to the parietal peritoneum and the surrounding viscera. Prior to this operation a radiological examination had indicated the probable presence of a duodenal ulcer. The stomach had been resected above and below the gastro-enterostomy; the proximal portion had been anastomosed with the jejunum at the site of the old gastro-enterostomy stoma and the duodenal end had been closed. The abdomen had been closed with through-and-through stitches and the patient had been returned to the ward in a low condition. The treatment of the adhesions had been postponed to a later date. The patient had made an uneventful recovery and had been discharged in three weeks. He had, however, been readmitted five weeks later complaining of pain of a very severe character on each side of the umbilicus, severe enough to prostrate him. On January 10, 1928, under ether anaesthesia a left-sided paramedial incision had been made into the upper part of the abdomen. The adhesions had been divided and the rough surfaces oversewn by pleating the peritoneum. The raw end of the omental adhesions had been inverted and covered with surrounding omentum, smooth endothelial-covered surfaces being left as far as possible. The patient had made a good recovery and had been discharged one month after operation. Since that time he had lost all his pain, vomiting and other symptoms; he had put on weight, was bright and cheerful and delighted with his condition after years of suffering.

Dr. Stacy also showed a woman, aged fifty-three years, a nurse, who had been operated on by him on December 21, 1926. He had performed cholecystotomy and appendicectomy through an oblique paramedial incision for gall stones and appendicitis. Practically ever since the operation she had suffered from generalized abdominal pain, at times accompanied by vomiting. Some of the attacks had been like those of girdle pain, most of the pain and tenderness being supraumbilical. After many forms of treatment, consultations and X ray examinations, a report had been received that adhesions were present in the region of the pyloric antrum and duodenum and it had been decided to operate. The patient had wasted and had been in a listless, whining condition which inclined some consultants to the view that the cause was functional and not organic. On June 14, 1927, under ether anaesthesia a supraumbilical incision had been made in the mid-line. Numerous adhesions had been found between the parietal peritoneum, the duodenum and the transverse colon; these had been divided and treated in the manner described for the previous patient. Four days later a decided improvement had been noted and the patient had gone on steadily improving, both in regard to general nutrition and the absence of symptoms. Dr. Stacy pointed out that the patient had been free of pain ever since the operation, that she had put on several stone in weight and was in every respect a transformed woman. He thought that in his professional career he had in no instance effected such a transformation from a condition of misery and chronic ill-health to one of radiant happiness.

Pulmonary Tuberculosis, Displacement of the Heart and Duodenal Ulcer.

DR. E. H. STOKES showed a male patient, aged forty years, a motor driver, who gave a history that twenty years previously he had suffered from chronic cough, night sweats and anorexia. He had lost weight and had suffered from haemoptysis on three occasions. Tubercle bacilli had been found in the sputum. After undergoing continuous medical treatment in hospitals and sanatoria for five years he had improved and no tubercle bacilli had been found in the sputum. Since that time he had been troubled with cough only in the winter time. The sputum had been examined periodically, but no tubercle bacilli had been found. Three and a half years before the meeting he had suffered from pain one or two hours after food. The pain had commenced in the epigastrium and had passed into the back. It frequently woke him up at night, had been relieved by food and alkalis and had been periodic in occurrence. There had been no vomiting, no nausea, no haematemesis and no melena. On X ray examination a report had been received that constant duodenal deformity was present and that this was probably due to ulcer. He had been admitted to Sydney Hospital and treated by means of Sippy's diet. He had been discharged free from symptoms. The symptoms had recurred three months previously and the patient was in hospital under treatment by a Lenhardt diet and alkalis. On examination it was seen that the heart was displaced to the right. Dr. Stokes thought that it was probably pulled over by pleural adhesions and he pointed out that there were signs of cavitation in the right lung. X ray examination confirmed these findings.

Transposition of Viscera.

Dr. Stokes also showed a male patient, aged thirty-four years, an engineer, whose transposition of viscera had been discovered by Dr. A. B. S. Owen during a routine examination following an injury to the lower ribs on the left side. Dr. Stokes said that transposition of the viscera was rare, but that it was important to recognize its presence as disease of the abdominal organs was sometimes present in patients who presented this curious abnormality. About eight years previously Dr. George Bell had successfully operated on a patient who was suffering from acute cholecystitis and whose viscera were completely transposed.

Adhesive Pericarditis.

DR. L. W. DUNLOP showed a male patient who was suffering from adhesive pericarditis. He pointed out that the man had suffered from repeated attacks of acute rheumatism and he drew attention to the enormous amount of cardiac enlargement which had occurred. This was a common feature of the condition and systolic retraction which was commonly found, was well exemplified in the patient.

Rheumatic Endocarditis.

Dr. Dunlop also showed a male patient who was suffering from rheumatic endocarditis affecting both the mitral and the aortic valves. He was of the opinion that the condition had undoubtedly started as a mitral stenosis and that direct spread of the infection had occurred through the heart wall to the aortic valve. At the time of demonstration the aortic lesion dominated the clinical picture.

Encephalitis Lethargica.

DR. H. C. ADAMS showed a school boy, aged fifteen years, who had been admitted to hospital on March 13, 1928. The patient had been quite well until December 31, 1927, when his legs had suddenly given way under him while he was playing. Later on during the same day he had had a fit—he had given a cry and had become rigid with spasm of the arms and legs and frothing at the mouth. On the following day he had had another fit and yet another seven weeks later. During this interval of seven weeks he had been quite well except for stiffness of the legs; he had complained of feeling as though he was walking on wires. Apart from the fact that he had suffered from otitis media eight years previously, his past history contained nothing of interest. On examination the boy had been thin and wasted and had lain restlessly in bed. He

had had an expression of imbecility on his face. He had appeared to be unable to understand what was said to him, except occasionally when he answered yes or no. He had been very restless, his whole body moving, but chiefly his hands and arms. He had pulled at the bed clothes and his fingers had twitched. His movements had been quite irregular and disorderly; his legs had been involved, but their movement had not been so pronounced. The arms had wasted, but not so much as the legs.

The pupils had been equal and had reacted to light and accommodation. The knee jerks had been exaggerated, the plantar reflexes extensor in type and the ankle jerks exaggerated. All other systems had been clear. The patient had gradually become worse during the following two days. He had resented interference and would not open his eyes. He had lain curled up in bed in a position of complete flexion. Irregular tremor of the whole body had been present and this had been especially pronounced in the right arm and leg and much more in the arm than in the leg. Kernig's sign had been present on both sides; the patient had had no control over his sphincters. On March 16, 1928, lumbar puncture had been performed, twenty-five cubic centimetres of clear fluid under increased pressure being withdrawn. Examination of the cerebro-spinal fluid had revealed a glucose content of 83 milligrammes per hundred cubic centimetres and a chloride content of 724 milligrammes. The cerebro-spinal fluid had not reacted to the Wassermann test, it had been sterile on culture and had contained only four lymphocytes per cubic millimetre.

The patient had begun to improve immediately after lumbar puncture. The tremor had not been so pronounced, but he had still been very irritable. Lumbar puncture had been repeated on May 25, and on April 10, 1928; on the first occasion five cubic centimetres and on the second 15 had been removed. On May 3, 1928, he had been discharged. His mental condition had been normal. No loss of power had been present, but he had dragged his right leg slightly. He had had a double Babinski reflex, the knee jerks had been exaggerated, but no rigidity had been present. On June 12, 1928, the patient had still been quite well. The signs had not changed, but it had been noticed that when he walked, the right arm did not move so much as the left. Examination of the fundi revealed no papillœdema, but slight pallor of both optic discs. No abnormal shadow had been found on X ray examination of the skull. There was no evidence of suppuration in either ear and the serum had not reacted to the Wassermann test.

Sciatica.

Dr. Adams also showed a man, aged thirty-five years, a bricklayer, who had been admitted on August 3, 1927, suffering from sciatica on the left side. The patient had had pain off and on since 1920 in the left buttock and in the lower part of the left leg. For the previous five months the pain had been almost continuous, although it was worse in the morning. He gave a history of Neisserian infection twenty years previously. He had an old shrapnel wound in the left buttock into which bismuth, iodoform and paraffin paste ("B.I.P.P.") had been inserted. Examination had failed to reveal any other abnormality in the alimentary, cardio-vascular, respiratory, nervous or urinary systems. X ray examination had revealed an opaque shadow in the left buttock which was regarded as being due either to some opaque infection or to the bismuth, iodoform and paraffin paste. On August 5, 1927, the buttock had been inflated with oxygen. By August 15 all the pain in the buttock had been relieved, but some pain had still been present in the calf of the leg. On August 17, 1927, the calf of the leg had been inflated with oxygen. The pain in the calf had been relieved, but slight pain had still been present in the ankle. This had gradually disappeared. On September 3, 1927, the patient had been discharged as cured. He had had no recurrence of the pain.

Rheumatoid Arthritis.

Dr. Adams's third patient was a woman, aged thirty-five years, whose condition on her admission to hospital on March 6, 1928, had been diagnosed as rheumatoid arthritis. She had suffered for ten years, the left elbow had been

fixed for seven years and all the joints had been affected at some time or other. She had suffered for eleven years from a chronic uterine discharge. On examination no abnormality had been found in the hip joints. The movement in both knee joints had been restricted to about 10°, grating and pronounced tenderness had been present especially on the medial aspect. The right knee had been kept flexed at an angle of 160° and pronounced thickening of the capsule had been present. The muscles of both lower extremities had been very wasted, more especially on the right side. Movement at the elbows had been limited to 10° and thickening had been present. Pronounced deformity had been present in the fingers of the right hand, but in the left only the third finger had been involved. The patient had been weak, anaemic, listless, unhappy, sleepless, restless, peevish and irritable. She had complained of anorexia and had had no interest in life whatever. On vaginal examination endocervicitis and endometritis had been discovered. On March 3, 1928, Dr. R. I. Furber had performed total hysterectomy and had also removed an ovarian cyst on the left side. After operation improvement had been gradual; she had begun to walk without the aid of crutches and her general condition had been excellent. After her discharge on April 19, 1928, she had been readmitted on May 30 for hot air and massage. She was responding moderately well to the treatment. Dr. Adams laid stress on the remarkable improvement which had occurred in her general condition after removal of the uterus.

Pernicious Anaemia.

Dr. Adams also showed a woman, aged sixty-six years, an old age pensioner, who had been admitted to hospital on June 19, 1928, with a diagnosis of pernicious anaemia. The patient's previous history had been typical of that condition. Examination had revealed three decayed teeth remaining in the mouth and there had been a history of teeth having fallen out. The condition had been regarded as being due to long standing toxic absorption. On examination achlorhydria had been found and a blood count on June 20, 1928, had revealed the following findings:

Erythrocytes, per cubic millimetre	1,160,000
Hæmoglobin value	34%
Colour index	1·4
Leucocytes, per cubic millimetre	2,400

On June 24, 1928, blood transfusion had been carried out, 450 cubic centimetres being injected by the direct method. Two days later another blood count had yielded the following result:

Erythrocytes, per cubic millimetre	2,620,000
Hæmoglobin value	47%
Colour index	0·9
Leucocytes, per cubic millimetre	7,480

In July a further blood count had yielded the following result:

Erythrocytes, per cubic millimetre	2,700,000
Hæmoglobin value	57%
Colour index	1·05
Leucocytes, per cubic millimetre	6,700

From June 21, 1928, onwards the patient had been treated with desiccated liver. This was prepared at the Homebush Meat Works. The patient had been having five teaspoonsfuls of the powder three times a day. No hydrochloric acid had been given.

Progressive Muscular Atrophy.

DR. A. W. HOLMES à COURT showed a male patient, aged sixty-three years, a labourer, who had been quite well until his left leg began to get weak six months previously. Walking had become difficult and his left leg had begun to drag. Since that time his other leg had become weak and he walked with the aid of sticks. For the previous two months the patient had had sharp pains in the legs from the knee downwards. His forearms were weak and he complained of shooting pains from the elbows to the wrists. There was no history of nervous disease in the family. The patient did not smoke, his consumption of alcohol was moderate and he denied having suffered from venereal disease. On physical examination it was seen that

his teeth were bad, but that his cardio-vascular and respiratory systems were normal. The pupils were equal and reacted to both light and accommodation. The knee jerks were exaggerated and the plantar reflex was flexor in type. The triceps, biceps, wrist and abdominal reflexes were exaggerated. No knee or ankle clonus was present. Sphincteric control was intact. The cranial nerves were normal. There were no trophic changes. In regard to the muscular system, the patient had complete loss of power in the muscles of the back, he was unable to lift himself off the bed; pronounced wasting of the muscles of both legs was present; the muscles of the hand and forearm were wasted, there was loss of power in both wrists and the thenar and hypothenar eminences and the interosseous spaces were wasted; fibrillary tremors of the muscles of the arms and legs were present and these became pronounced on the slightest stimulation. Scars were present on the back of the right leg; they were red and papery, especially under the right knee. The patient's blood had not reacted to the Wassermann test. Normal faradic excitability was present in all the muscle groups and galvanic response was equal on both sides. There was no lower motor neurone lesions. The patient's condition was unchanged since his admission. He was being treated with a biniodide of mercury mixture.

Diabetes Insipidus.

DR. HOLMES à COURT'S second patient was a boy, aged thirteen years, who had been perfectly well until four years previously when he had had a fit. Before the occurrence of the fit he had seen coloured lights and he had been told that he became blue and cried out when he was in a fit. Shortly after this he had developed a frequent desire to micturate and had gradually become very thirsty. The fits had become frequent. He had been in Lewisham Hospital for six months; during this time the fits had been less frequent, but polyuria and polydipsia had continued in spite of treatment. He had vomited a great deal after each fit. He had had no headaches, but his vision had been dim and it had been worse occasionally. He had not complained of pain. He had lost weight slightly. On occasions his appetite had been very large; at other times his desire for food had been extreme, but he had been unable to take it because he felt nauseated. His last fit had occurred five days before admission. He had suffered from mumps and measles, but from no other illnesses. The patient was a red-haired, freckled boy, poorly nourished with a harsh and dry skin. His intelligence was normal. His tongue was furred, his teeth were moderately good. The abdomen was soft and moved freely, some tenderness was present in the suprapubic region, but there was no rigidity. No abnormal masses could be felt in the abdomen, but tenderness was present in the lumbar region. Neither the liver nor the spleen was palpable. The respiratory and cardio-vascular systems were normal. Examination of the nervous system revealed normal physical functions, motor power and sensation. All the cranial nerves were intact, but there seemed to be slight diminution of the medial half of the left field of vision. The pupils reacted to light and accommodation. The knee jerks were exaggerated. The plantar reflex was flexor in type. He was passing 27 to 31·5 litres (six to seven gallons) of urine in the twenty-four hours. The urine was acid, its specific gravity was 1,001 and it contained neither albumin, sugar, pus nor blood.

The patient had had no fits since admission. An X ray examination of the skull had been inconclusive. A glucose tolerance test had been carried out. Half an hour before the test the blood sugar had been 105 milligrammes per hundred cubic centimetres, one hour after the test 118 milligrammes, one and a half hours after the test 98 milligrammes and two hours after the test 78 milligrammes; no sugar had appeared in the urine. The result of the Wassermann test had been inclusive. The patient was being treated by 0·5 cubic centimetre of pituitrin twice a day.

Syringomyelia.

DR. HOLMES à COURT also showed a man, aged forty-five years, who had a history that in December, 1927, an ulcer, about the size of threepence, had appeared on the sole

of the left foot. This had been getting worse prior to admission. A yellow offensive discharge had been present and on May 9, 1928, a small piece of bone had been extruded. At the age of five years the fingers of the patient's right hand had become contracted, no pain had been present. Four years later the same had happened to the fingers of the left hand and at that time the toes of both feet had become similarly affected. While the patient was at school, his eyes had become prominent, he had suffered from photophobia and his mouth had begun to lose its muscular tone. The condition of the fingers and toes had not progressed for the previous fifteen years. The patient had not suffered from pain; he had lost all sensation in arms and legs, but complained of burning and tingling in the fingers. The right elbow had been fractured and dislocated when the patient was fourteen years of age and he had been operated on for *talipes equino-varus* in 1921. He had injured his left fore-finger in 1927 and had lost the finger at the first interphalangeal joint. He smoked sixty grammes (two ounces) of tobacco every week, he did not use alcohol and he denied venereal infection.

The patient was a well nourished man. His eyes were prominent, his lips were large and appeared to have lost their muscular tone. Some ectropion of the lower lids was present. The tongue was red and cracked, but no other abnormality could be detected in the alimentary system. The respiratory and circulatory systems were clear. The first, second, fourth and sixth cranial nerves were intact. The patient was unable to close his eyelids. Sensation was impaired over the second and third branches of the fifth nerve. The patient could not wrinkle his forehead. Muscular tone of the mouth was lost and labial paralysis was present on the left side. The eighth and twelfth nerves were intact. Voluntary movement of the right wrist was lost. There was loss of feeling to pain, touch, heat and cold on both arms, hands and legs extending up to the thigh. The right forearm was wasted and the distal half of the left forearm. The fingers of both hands were contracted, with the metacarpophalangeal joint extended and with the phalangeal joints flexed. The right ankle was ankylosed. The anterior aspect of the dorsum of both feet was scaly and the skin was erythematous. There was an offensive discharge from a penetrating ulcer on the outer side of the sole of the left foot. X ray examination had been made and involvement of the metatarsal region of both feet reported. On June 12, 1928, another trophic lesion on the sole of the right foot had broken down. The ulcers were being treated by baths of Dakin's solution and the lesions were healing slowly. The patient was being treated by Easton syrup and his condition had not changed.

Hæmatomyelia and Hemianæsthesia.

DR. G. C. WILLCOCKS showed a patient, aged thirty-two years, who complained of weakness of the right leg and hand, of sudden onset ten years previously. The condition had been discovered after an illness of some months, the result of shell concussion. Anæsthesia to pin prick was found on the right side and the whole side was anaesthetic including part of the conjunctiva. There was wasting of the small muscles of the right hand and of the forearm, with loss of power in these parts. The knee jerks were brisk, but otherwise no abnormality was detected—no clonus was present and the plantar reflexes were flexor in type. Dr. Willcocks held the opinion that the anæsthesia was probably functional in type. The diagnosis lay between the presence of cervical ribs, progressive muscular atrophy, syringomyelia, poliomyelitis, traumatic myelitis or hæmatomyelia. Diagnosis depended on the exact history to some extent, but a moderately sudden onset seemed probable and the lack of alteration in the condition for some years should exclude all causes except myelitis or some kind of hæmatomyelia. The lack of sensory changes corresponding to the muscle wasting indicated a lesion in the cord rather than in the nerve roots or in the peripheral nerves.

Diabetes Mellitus.

DR. R. C. WINN showed a female patient who had been admitted to hospital on June 20, 1928, because of ketosis associated with a respiratory infection. It had been

thought advisable to admit the patient as she suffered from milk diabetic coma in January, 1928, for which she had been admitted to the Royal Prince Alfred Hospital. A blood sugar estimation had not been made on admission, because the symptoms and urinary findings had been sufficient evidence of *diabetes mellitus*. The patient had been using five units of "Insulin" three times a day before meals and this arrangement had been followed on the two days following admission. On June 23, 1928, fifteen units had been given, divided into a morning dose of ten units and an evening dose of five units. This arrangement of dosage was in accordance with the recommendation of Jonas and his collaborators in the *Archives of Internal Medicine* of March 15, 1925. The patient had been put on a diet of about 1,600 calories, the diet menu being calculated by the use of the "diet group" method advocated by Dr. Winn in THE MEDICAL JOURNAL OF AUSTRALIA of March 5, 1927. "Insulin" dosage at first had been controlled by daily estimations of the urinary glucose, the increase being in the proportion of one unit for every two grammes of glucose excreted on the previous day. When the urine had become sugar-free on June 28, "Insulin" dosage had been controlled by blood sugar estimation. Samples had been taken at midday, this being the time when the blood sugar had been found to be lowest in the cases reported by Jonas. It had then been found that the patient had a high threshold. The blood sugar at 12.30 a.m. on June 27 had been 203 milligrammes per hundred cubic centimetres and at 9.30 a.m. 263 milligrammes, although no sugar was found in the urine. An effort had been made to determine the threshold. A blood sugar curve had been plotted at breakfast on July 3, 1928, the meal consisting of twenty grammes of carbohydrate and thirty-three grammes of glucose; the results had been as follows: No "Insulin" had been given before breakfast, the blood sugar had been 183 milligrammes and no sugar had appeared in the urine. Half an hour after breakfast the blood sugar had been 201 milligrammes. One hour after breakfast the figure had been 276 milligrammes and sugar had appeared in the urine. One and a half hours after breakfast the blood sugar had been 266 milligrammes and two hours after breakfast 280 milligrammes with sugar in the urine. On July 11 five units of "Insulin" had been given before the same breakfast. Before breakfast the blood sugar had been 184 milligrammes with no sugar in the urine. Half an hour after breakfast the blood sugar had been 214 milligrammes with a trace of sugar in the urine, one hour after breakfast 240 milligrammes with sugar in the urine, one and a half hours after breakfast 235 milligrammes with sugar in the urine, two hours after breakfast 244 milligrammes with sugar in the urine. On the last occasion the bladder had been catheterized. Fourteen units of "Insulin" had been given in the morning and eight in the afternoon. It was concluded that the renal threshold must be under 214%, though it had previously appeared to be over 263%. It was probably not below 203%. The usual cause for a high threshold was an arterio-sclerotic kidney, but there were no casts in the urine and the systolic and diastolic blood pressures were 100 and 65 millimetres of mercury respectively.

Dr. Winn said that the patient's high threshold had prevented him from using the high carbohydrate and high "Insulin" "courses" advocated by Chabaudier.

Cerebral Tumour.

DR. GEORGE BELL showed a male patient, aged twenty-two years, from whom a cerebral tumour had been removed. A full report of this case will be published in a subsequent issue.

Fracture Dislocation of the Astragalus.

Dr. George Bell also showed a young man, aged twenty-one years, who had been admitted to hospital on August 17, 1927. A heavy weight (half a ton) had fallen on to his right foot and he had been brought to the casualty room suffering from pain over the medial side of the right foot with distortion of the foot and swelling of the ankle. X ray examination had been made forthwith and a report of fracture of the right astragalus had been received. The patient had thereupon been admitted. The patient had stated later on that while he was crouching with both knees bent, a weight of one ton had fallen on

to his right knee. The patient had refused to have the fragments of bone removed. Examination had revealed forward and outward displacement of the foot with considerable swelling around the malleoli and posteriorly. No movement at the ankle joint had been possible. Extreme tenderness had been present over the medial malleolus, but there had been no wounds. The posterior half of the astragalus had been palpable just beneath the skin posteriorly. The toes had been numb. All other systems had been normal.

Under anaesthesia an unsuccessful attempt had been made by Dr. Bell to reduce the fracture. A calcaneal hook had then been inserted and extension had been made, but reduction had been impossible. The hook had been removed and the foot put up on back and side splints. On the following day, August 18, 1927, the patient had been seen in consultation by Dr. C. E. Corlette. Dr. Corlette had made the following statement:

The *talus* is fractured and tibia has descended in between front and back fragments of *talus*. The back fragment has been squeezed back and turned over—it is pressing against the skin and will cause nutritional troubles. The ankle is permanently ruined. I think the best thing to do now is to remove the posterior fragment and perhaps the anterior fragment too. But I have never seen a useful foot after astragalectomy—the foot has been permanently stiff and painful and walking next to impossible. The best result will be obtained by amputation.

On August 19, 1927, Dr. Bell had performed right astragalectomy. An incision had been made 2·5 centimetres (one inch) behind and just above the medial malleolus of the right leg over the posteriorly displaced fragment. The *tendo Achillis* had been drawn aside and the bone exposed. The posterior fragment had been removed by bone forceps after being freed by blunt dissection. The wound had then been closed. The anterior fragment had been removed through an incision on the lateral aspect of the dorsum of the foot after the joint capsule had been opened. After closure of this wound back and side splints had been applied, the foot being held forwards by means of strapping applied to the foot piece of the splint. After operation the patient had made good progress. On September 7, 1927, the ankle had been removed under anaesthesia and a light plaster applied with the foot at right angles. After nine days the plaster had been cut and subsequently the patient had been allowed to remove the plaster and to move the foot twice a day. By September 25, he had begun to walk on crutches without any pain and on October 1, 1927, he had been discharged able to walk quite well. At the time of demonstration the patient said that he was able to dance.

Tumour of the Right Orbit.

Dr. Bell's third patient was a man who was suffering from a tumour of the right orbit. The tumour had caused considerable displacement of the eyeball and the eye had become very prominent. The tumour was hard and nodular and lay under the upper margin of the orbit. Dr. Bell said that he proposed to undertake an operation for its removal and that he hoped to report the case in full after this had been done.

Urological Conditions.

DR. REGINALD BRIDGE showed a number of pyelograms illustrating the various pathological lesions of the kidneys and urine. One set of pyelograms had been obtained from five patients who suffered from symptomless haematuria. It had been discovered that three of these patients suffered from hypernephroma and two from papillary carcinoma of the renal pelvis. Dr. Bridge pointed out that none of these conditions had been recognizable without cystoscopy and pyelography. He demonstrated the specimens which had been removed at operation, and showed microscopical sections from each.

Another set of pyelograms had been obtained from four patients who suffered from unilateral renal tuberculosis. The kidneys and microscopical sections were shown.

A third set of pyelograms was shown to demonstrate the varied pathological processes which go to form the

clinical syndrome of so-called chronic pyelitis. The lesions included stricture of the ureter, chronic pyonephrosis, kinks of the ureter, dilated and infected calyces *et cetera*.

A fourth set of pyelograms was shown to illustrate such conditions as hydronephrosis, aberrant renal artery and doubtful shadows and tumours which had to be localized.

Dr. Bridge also showed microscopical sections of malignant disease of the prostate, bladder and kidney.

Squamous Epithelioma of the Jaw.

DR. HOWARD BULLOCK showed a male patient, aged sixty years, who had been operated upon by another surgeon six years previously for growth on the lip. Twelve months previously a sore had appeared on the chin. He had been advised to have X ray treatment. This had been started eleven months previously when the sore was the size of a shilling. With this treatment the growth had gradually extended to the mouth and neck and when the patient was seen on April 14, 1928, a fungating mass had been present which had eaten away the chin, a considerable portion of the neck and all the lower lip, and which had also invaded the upper lip. The ulcerating mass, lower jaw and submaxillary and upper deep cervical glands had been removed on April 27 and Dr. Keith Inglis had reported the growth as being a squamous epithelioma. Dr. Bullock pointed out that a feature of the case had been the nursing. The tongue had been suspended by a stitch to a pulley and weight, sufficient to permit respiratory movement, but preventing the tongue from falling back and causing suffocation. This manoeuvre had greatly facilitated the nursing. The operation was horribly mutilating, but Dr. Bullock pointed out that the patient had lost his pain, was in better health and looked forward to some plastic operation being carried out in the near future.

Adeno-Carcinoma of the Rectum.

Dr. Bullock also showed a male patient, aged seventy years. This patient had first been seen on November 3, 1919, and operation had been performed at Sydney Hospital three days later. Before operation the patient had complained of loss of blood between motions for about six months, of gradual loss of weight and of a feeling of weakness. On examination the patient had been very pale and a mass had been palpable in the rectum. Abdomino-perineal excision of the rectum had been carried out after the method of Ernest Miles. Two growths had been found 22·5 centimetres (nine inches) apart, one being about ten centimetres (four inches) inside the anus. The specimen had been examined by Dr. Walton Smith who had decided that it was an adeno-carcinoma. Dr. Bullock pointed out that the patient enjoyed the best of health, carried on his occupation of labourer and had full control of the artificial anus. He had apparently been cured by surgery alone.

Squamous Epithelioma of the Tongue.

Dr. Bullock's third patient was a male, aged sixty-two years, who had first been seen on October 26, 1924, complaining of a growth on the tongue. The growth had been present for seven months. He had gone to another State for deep X ray therapy and after giving it an extended trial, had found that the growth was still spreading and that his health was giving way. On examination a huge fungating carcinoma had been found extending over the dorsum of the anterior third of the tongue. Under ether anaesthesia at Sydney Hospital the submaxillary, upper and lower deep cervical glands had been removed on October 30, 1924, together with the sterno-mastoid muscles of both sides and three-fourths of the tongue. Dr. Keith Inglis had reported on the growth as a squamous epithelioma. Dr. Bullock drew attention to two points: first, the application of X rays had stimulated growth in the carcinoma; second, there were no signs of recurrence four years after operation.

Encephalograms.

DR. LYLE BUCHANAN showed a series of encephalograms. These will be published in a subsequent issue.

Resection of the Fibula.

Dr. Buchanan also showed a male patient, aged eighteen years, whose fibula had been excised for sarcoma and who

had subsequently received irradiation at the hands of Dr. George R. Hamilton. On August 20, 1927, the X ray appearances had been those of chronic osteomyelitis. At operation two days later the tumour had been excised, apparently intact, and examination had revealed this to be a sarcoma. The head of the fibula and the malleolus had been preserved, but the remainder of the bone removed. Nineteen days after operation the patient had walked with an outside iron which he soon discarded. At the time of demonstration the patient was able to play football without any apparent disability from the loss of his fibula.

A Case for Diagnosis.

Dr. Buchanan also showed a male patient, aged forty-one years, a greengrocer. According to his previous history he had suffered from pneumonia in 1917 which had kept him in bed for twelve days. He had suffered from colds and coughs until the age of puberty and from measles at the age of seven. He had had no other serious illness. The patient had come complaining of a lump in the groin which had been present for six months and which had been ascribed to a fit of "dry coughing." He had also had irregular attacks of nausea and of abdominal pain, radiating from the left renal angle to the left of the umbilicus. He had had no cough since the occurrence of the lump. On examination a right inguinal bubonocele had been found and also a very large spleen which was not abnormally mobile, and a small epigastric hernia. Physical examination of the heart, lungs, nervous and alimentary systems had revealed no abnormality. A moderate general enlargement of the lymphatic and salivary glands had been noted. No reaction had been obtained to the Wassermann test, the precipitin test for hydatid disease and the von Pirquet test. No positive findings had resulted from the taking of a pyelogram and from prostatic massage. A blood count had yielded the following result:

Erythrocytes, per cubic millimetre	5,400,000
Hæmoglobin value	85%
Colour index	0·8
Leucocytes, per cubic millimetre	8,000
Neutrophile cells	68·5%
Lymphocytes	25%
Eosinophile cells	2%
Mononuclear cells	4·5%

X ray examination of the gastro-intestinal tract had revealed the presence of chronic appendicitis. The urine had been slightly acid and had contained pus; no tubercle bacilli had been found in a twenty-four hour specimen.

Operation had been undertaken on October 21, 1927, and the spleen, weighing 481 grammes (seventeen ounces), had been removed together with the appendix and a lymphatic gland for examination. In the pathological report it had been stated that many white nodules in the spleen were visible to the naked eye. Microscopical examination definitely excluded Banti's disease. There were innumerable foci of granulomatous tissue with epithelial and giant cells. No necrosis was present. The condition was not like that seen in Hodgkin's disease and bore more resemblance to syphilis or tuberculosis. Similar appearances were seen on examination of the lymphatic gland.

The patient had remained well since operation. With the exception of three or four mild vomiting attacks he had had no cough and no pyrexia. His hernia had recently been operated upon with success. A skiagram of his lung was shown. In the picture could be seen the same appearances as had been evident before his first operation, namely fine mottling of both lungs which was more pronounced towards the bases. At the time of demonstration physical examination revealed no abnormality and the tuberculin test yielded no reaction.

Plastic Operations.

DR. ARCHIE ASPINALL showed two patients who were being treated by plastic operation, the one after malignant disease and the other after a gunshot wound of the nose. These will be reported in a subsequent issue.

Skiagrams.

DR. J. G. EDWARDS showed a series of interesting skiagrams.

Infections of the Hand.

A cinematographic film was shown depicting the various forms of lesion which resulted from septic infections of the hand.

Administration of Oxygen.

DR. H. S. WARDLAW showed an apparatus for the administration of oxygen. He said that Dr. Whitridge Davies, Lecturer in Physiology and Pharmacology in the Leeds University, had discussed the administration of oxygen in *The British Medical Journal* of November 19, 1927. Experiments had been made by Dr. Davies and Dr. Gilchrist who used: (i) The tube and funnel method, (ii) the nasal catheter method, (iii) the Haldane method and (iv) the Davies and Gilchrist apparatus with nasal tube and with mask.

The results of their experiments showed very low figures of oxygen percentage in the alveolar air for the tube and funnel and nasal catheter methods, due mainly to the fact that only half the oxygen administered by these means entered the respiratory tract, the other half being carried away by the expired air. With large rates of oxygen flow a considerable increase in alveolar oxygen percentage could be obtained by both funnel and nasal catheter, but the low efficiency percentage indicated the very considerable wastage of oxygen necessary to obtain this object. In general it could be said that with the small rates of oxygen flow usually adopted the funnel and nasal catheter methods were absolutely ineffective.

In the administration of most therapeutic agents quantitative methods of dosing were used. It was only with a certain knowledge that an effective concentration of oxygen in the inspired or alveolar air had been obtained, that it could justly be said whether or not oxygen was of benefit. There was a further objection to the nasal catheter method; the rate of oxygen flow necessary to produce satisfactory increase in the alveolar oxygen percentage was so large that great discomfort was caused (except in infants).

Haldane's method was the first widely adopted method of administering oxygen quantitatively; it had been introduced during the war and used with great benefit for gas poisoning. The oxygen was delivered into a small bag attached to a mask and remained in the bag during the expiratory phase of respiration. In practice on account of its simplicity the Haldane apparatus had been the most suitable for ordinary clinical use. Davies and Gilchrist claimed to have improved upon it in several respects, one feature being that they could calculate the alveolar oxygen percentage; precise knowledge of this they claimed was much more than the mere academic nicety; not only was there the satisfaction of producing a definite effect, but one could also gauge the severity and extent of the pulmonary damage.

Radium in Dermatological Conditions.

DR. LANGLOH JOHNSTON, DR. NORMAN PAUL and DR. GEORGE R. HAMILTON showed a series of patients who had been cured of various dermatological conditions by means of radium. Twenty-five patients were shown to exemplify the cure by radium of rodent ulcers in various parts of the face. One patient had suffered from epithelioma of the dorsum of the hand, one from epithelioma of the skin of the nose, one from epithelioma of the chin. Two boys had suffered from spring catarrh of the upper eyelids and had been cured by radium. Seventy-four lantern slides were shown of patients both before and after treatment for rodent ulcer, epithelioma, angioma, keloid scars and spring catarrh.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

Keirle, Norman Arthur Daniel, M.B., Ch.M., 1924 (Univ. Sydney), Fairmount, North Manly.
Stanley, William Ambrose, M.B., Ch.M., 1925 (Univ. Sydney), 26, Wellington Street, Bondi.
Wing, Lindon Worledge, M.B., B.S., 1927 (Univ. Sydney), Coonabarra Road, Wahroonga.

Correspondence.

RESEARCH AND MATERNAL MORTALITY.¹

SIR: The publication of Dr. Marshall Allan's report on maternal mortality in Victoria in your journal this year, following on Dr. Morris's essay, dealing with the same subject in the Commonwealth and New South Wales in 1925, should inspire some comment from those who do not see eye to eye with the writers on all their assumptions and all their conclusions. As one of these, may I submit some criticisms not only of these reports, but of others published elsewhere in the English-speaking world?

All alike are concerned with death rates, generally of mothers, but sometimes of young infants, though the latter is mainly coincidental and not a main feature (as it should be) of the studies.

The latest English report (British Medical Association Committee in *The British Medical Journal Supplement* of April 28, 1928) admits that the profession does as well as its knowledge and facilities permit. All others practically blame the doctors for the death rate. Dr. Allan is kinder to us than Dr. Morris, but they are really all in a tale. The English Committee is the only one that recognizes that the condition of the patient is at least as important as the character of the attendance on her and it suggests research as to the factors affecting her innate resistance to our misdeeds apparently!

When this is the view of the leading lights of our profession, it is no wonder that lay trustees might think it advisable to subsidize bush nurses who have no death rate among their mothers and only a small one among their babies, than to subsidize further a medical profession that can only lament its own insufficiency. They can hardly be expected to perceive, until it is pointed out to them, what seems hidden from our own authorities, namely, that these nurses and their associated doctors are dealing with a selected portion of the community—rural mothers whom both Australian reports show to give better results than townswomen—and that the superiority of their reports is due first to the superiority of the mothers with whom they are dealing, and second that they apply very successfully knowledge of which they would have had none, had not the medical profession first discovered it and then imparted it!

What the success of the Bush Nursing Associations does show is that the conscientious application of present knowledge and methods is enough to do away with puerperal sepsis of accidental origin and that a reasonable amount of antenatal care in the woman of average health is sufficient to safeguard her against death, though it will not always save her infant.

What does really need inquiry is why country mothers do better than town mothers. It is certainly not merely a matter of management at labour and during pregnancy. It must be related to such important factors as the country diet and mode of life in general. The mere claims for antenatal care suffice to prove that the general health of the mother is of enormous import both to herself and her infant, whether in the country or in the city. I have practised both in the country and in the city and I know that town mothers and babies are not so well as country mothers and babies, a knowledge that is confirmed by the findings of both Australian reports. Why is this? No one has attempted to answer. I think that it is because of the much wider prevalence of focal sepsis, due to dental disease, in the city as compared with the country. (It is during the last twenty years that the death rate has increased after a period of decline and it is during the same period that the young mothers with conserved dead, filled and capped teeth have come into child bearing.) It seems clear that there is some factor affecting Australian cities more than the country districts and taking effect in the past one or two decades and it seems strange that it has neither been sought nor found in the recent researches.

It is a fact that any or all of the reports dealing with maternal death rates may be carefully read and yet no

iota of difference be made in the actual treatment of one's subsequent patients, except indeed that Dr. Allan's report may well give pause to the Cæsarean enthusiast before he inflicts so fatal a treatment on his patients. The explanation of such a practical failure in the results of so much laborious work is that no author has been able to give a comprehensive interpretation of the field surveyed; partly because he is invariably wedded to the old tradition of puerperal sepsis being always accidental in origin (once nearly true, now rare) and partly because the reports deal only with end results and not at all with underlying conditions. The study of death rates shows us the existence and the extent of the evil, but it cannot unveil root causes. That can only be done by the study of incipient conditions.

Dr. Allan coolly accuses us of giving false or incapable certificates, when he happens to disagree with our diagnoses, though he has never seen the patient nor heard the doctor's reasons for his diagnosis! He distinctly says that every febrile condition in a puerperal woman with inflammatory conditions of the pelvic organs should be considered to be due to sepsis, whether there be other foci in the body or not. Are we really to give up any attempt at differential diagnosis in obstetrics and if we do, can we make real progress in midwifery? Surely it is in being content to accept such views that we stultify ourselves and find on reading all reports that we are no wiser as regards management of our patients than we were before. Dr. Allan thinks that 50% of puerperal pyrexia is due to other causes than accidental infection, though he gives no supporting statistics. A study of my own, dealing with a small number of cases (read before a section of the Victorian Branch of the British Medical Association in Melbourne in November, 1927, but not published) showed a much larger percentage (80% to 90%) were of autogenous origin. It also showed that febrile recoveries occurred practically only in those who had had troubled pregnancies (usually pyelitic or albuminuria) and were independent of the application of forceps and of laceration. So that I came to the conclusion that puerperal fevers and puerperal toxæmias were but differing aspects of the same underlying disease. It is interesting to observe in this regard that the figures for the three main terminal divisions under which the death rate is commonly studied, show corresponding curves as if there were a distinct correlation between them. Such an explanation of the puerperal fevers has also the advantage of offering a reasonable explanation of the associated congenital debilities which accidental puerperal sepsis certainly does not do.

Labour is undoubtedly a crisis to both mother and infant, it may be likened to a hill-climbing test for an engine and makes latent defects patent. This is shown by the frequency of maternal complications and the high infantile death rate among those who seemed well up to the onset of labour. Reactionary fevers and relapses of former illness (especially pyelitis) frequently follow.

Generations ago it was demonstrated that the death rate of both mother and baby rose with the duration of labour. No student of death rates today attends to the character of labour except to blame any interference (however necessary) for the subsequent fever (if any) or death (if it follow) though it is common knowledge that forceps is not infrequently a life-saving instrument to both mother and baby. Forceps are liable to abuse, and carelessness in applying them may lead to serious sepsis; but what really requires attack is the problem of what prevents the woman delivering herself easily.

After all the mother and the baby are the important factors in a labour. It is the attendant's part to hold a watching brief and be ready to help in case of accident; but it should never be forgotten that a healthy mother both can and will deliver herself without any assistance whatever. The real problem of midwifery is why assistance is so often needed; in other words, why is the present day labour so often faulty?

While we devote ourselves to management only as the source of all ills at labour, no advance can be made. Good doctors, good nurses, good hospitals are but palliative at best; a physiological labour is the prime necessity.

¹The publication of this letter has been delayed owing to its inordinate length.—EDITOR.

Let us have done with maternal mortalities and attend to child-bearing itself. There are many problems of daily importance in connexion with it yet to be solved, for instance:

- What is the effect of diet on child-bearing?
- What is the effect of focal sepsis on child-bearing?
- What causes premature labour?
- What are the indications and the results in a series of forceps cases?
- What is the relation between the health of the infant and the mother?
- What is the causation and the effects of pyelitis during child-bearing?

Yours etc.,

MARY C. DE GARIS.

Geelong,
June 10, 1928.

THE TREATMENT OF MALARIAL PATIENTS IN AUSTRALIA.

SIR: May I voice a small protest regarding the treatment of malarial convalescents on return to Australia. A number of patients of mine and of other practitioners in the Islands have on returning home consulted a doctor for some other matter and have promptly had their courses of quinine interrupted or stopped. Result—recurrence of the malaria. There seems to be a tendency, even among the leading city physicians, to exaggerate the dangers of quinine administration, for example, in pregnancy, and to ascribe all sorts of symptoms to an excess of the drug that have nothing whatever to do with it.

Yours, etc.,

C. MERVYN DELAND.

Obituary.

ALEXANDER CLOW FRASER.

WE regret to announce the death of Dr. Alexander Clow Fraser which occurred at Korumburra, Victoria, on August 30, 1928.

JAMES KERR.

WE are indebted to Dr. Muir for the following notes:

Dr. James Kerr died at Orbost, Victoria, at the end of June, 1928, after a protracted illness. He was born at Dumfries, Scotland, on October 3, 1862. His father was Dr. William S. Kerr, a well-known and esteemed practitioner in the ancient burgh of Dumfries, that stronghold of the border clan of Kerr in the old days of foray and constant warfare with the English.

James Kerr received his education at Dumfries Academy, where he had as a schoolfellow Barrie, now Sir J. M. Barrie. Proceeding to Edinburgh University, then the principal medical school in the British Empire, he had an excellent record in the study of medicine and surgery, gaining several first class certificates and medals in physiology, medicine and surgery. Graduating Bachelor of Medicine and Master of Surgery in 1884, James Kerr was appointed house surgeon at Dumphries Infirmary. Owing to indifferent health he later went to sea as a ship's surgeon and made several trips to Australia with the Orient Company. He decided to settle in Australia and commenced practice in Orbost in 1889 and continued there till his death. During this period of thirty-nine years James Kerr saw the township of Orbost grow from a few scattered houses to its present considerable dimensions and assisted in bringing at least two generations of the inhabitants into the world. He was in fact looked upon by all the members of the community as their father and friend and in their hour of utmost need and there was none who did not deplore his death.

In his earlier years of practice he had many hardships, but with the advent of the motor car his life became much more tolerable. His hobby was literature, particularly on the historical side, and he possessed a considerable library of standard works.

In 1893 James Kerr married Miss Temple and he left her a widow with three sons and a daughter. He was a typical Scot, kindly and hospitable, and was a physician of the old school who did not run his practice on commercial lines.

Post-Graduate Work.

TUTORIAL CLASSES IN ANATOMY AND PATHOLOGY IN MELBOURNE.

The Melbourne Post-Graduate Committee for Post-Graduate Work has arranged the following course of lectures and demonstrations in anatomy and pathology. The course has been planned to meet the requirements of the University for candidates for the master of surgery examination. The course will commence on October 1, 1928, and will be continued during the months of October, November, December and January.

- Regional anatomy, five lectures by Professor R. J. A. Berry;
- Regional anatomy, fifteen lectures by Dr. C. H. C. Scarby;
- Osteology, fifteen lectures by Dr. A. E. Coates;
- Surgical pathology, twenty-five lectures by Dr. C. J. O. Brown.

The fee for the course is twenty guineas. Medical practitioners intending to attend the course are requested to notify the Honorary Secretaries, Dr. J. W. Dunbar Hooper and Dr. Harold R. Dew (12, Collins Street, Melbourne) as soon as possible. They will be asked to meet the lecturers at the Anatomy School, University of Melbourne, at 4.15 p.m. on October 1, 1928, to arrange the details to suit the convenience of all participants.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on September 3, 1928.

The following degree was conferred:

Doctor of Veterinary Science: Ian Clunies Ross.

Dr. Ian Clunies Ross is the first graduate in veterinary science to qualify for admission to the doctorate in Sydney University. After a distinguished record in the Department, he graduated with honours in 1921 and then gained the Walter and Eliza Hall Travelling Fellowship. After completing the tenure of this scholarship, Dr. Clunies Ross was appointed to the teaching staff of the Department. At the present time he occupies the position of Research Officer to the Council for Scientific and Industrial Research. One of the examiners in reporting on the thesis submitted for the higher degree stated that the thesis constitutes the most important individual contribution yet made on the prevention of hydatid disease in Australia.

A cablegram was received from Professor W. J. Dakin, of the University of Liverpool, accepting the offer of the Chair of Zoology in the University. Professor Dakin, however, will not be able to take up his duties in Sydney before the next academic year.

The following graduates have qualified for the Diploma in Tropical Medicine: Dr. C. R. Wiburd and Dr. Phyllis Haddow.

The resignation of Dr. N. Ross Smith as part time Demonstrator in Anatomy was received and accepted as from the August 11.

Books Received.

THE EXTRA PHARMACOPEIA OF MARTINDALE AND WESTCOTT, Revised by W. Harrison Martindale, Ph.D., Ph.Ch., F.C.S.; Nineteenth Edition; Volume I.; 1928. London: H. K. Lewis and Company, Limited. Foolscape 8vo., pp. 1243. Price: 27s. 6d. net.

STERILITY IN WOMEN: DIAGNOSIS AND TREATMENT, by Sidney Forsdike, M.D., B.S. (London), F.R.C.S. (England and Edinburgh); 1928. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 141, with illustrations. Price: 9s. net.

RENÉ THÉOPHILE HYACINTHE LAENNEC: A MEMOIR, by Gerald B. Webb, M.D.; 1928. New York: Paul B. Hoeber, Incorporated. Demy 8vo., pp. 166. Price: \$2.00 net.

MODERN MEDICINE, ITS THEORY AND PRACTICE, Edited by Sir William Osler, Bart., M.D., F.R.S., Re-edited by Thomas McCrae, M.D., Assisted by Elmer H. Funk, M.D.; Volume VI.; Diseases of the Nervous System; 1928. Philadelphia: Lea and Febiger; Sydney: Angus and Robertson, Limited. Royal 8vo., pp. 964, with illustrations. Price: 42s. net.

Diary for the Month.

- SEPT. 17.—New South Wales Branch, B.M.A.: Organization and Science Committee.
- SEPT. 18.—Tasmanian Branch, B.M.A.: Council.
- SEPT. 18.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- SEPT. 19.—Western Australian Branch, B.M.A.: Branch.
- SEPT. 19.—Central Northern Medical Association, New South Wales.
- SEPT. 19.—Western Medical Association (Bathurst), New South Wales.
- SEPT. 19.—Section of Obstetrics and Gynaecology, New South Wales Branch, B.M.A.
- SEPT. 25.—New South Wales Branch, B.M.A.: Medical Politics Committee.
- SEPT. 26.—Victorian Branch, B.M.A.: Council.
- SEPT. 27.—New South Wales Branch, B.M.A.: Election of Members to Federal Committee.
- SEPT. 27.—South Australian Branch, B.M.A.: Branch.
- SEPT. 28.—Queensland Branch, B.M.A.: Council.
- SEPT. 29.—Eastern District Medical Association, New South Wales.

Medical Appointments.

Dr. W. B. Kerr (B.M.A.) has been appointed Deputy Quarantine Officer at Port Kembla, New South Wales.

Dr. Ivan Bede Jose (B.M.A.) has been appointed an Honorary Commissioner to inquire into and report upon the treatment of diseases of the kidney and bladder in Great Britain, the Continent of Europe and the United States of America.

Dr. George Norman Lorimer (B.M.A.) has been appointed Honorary Radiologist at the Mount Gambier Hospital, South Australia.

Dr. Henri Victor David Baret (B.M.A.) has been appointed Director, Tuberculosis Division, Office of the Director-General of Public Health, Sydney.

Dr. Renzo Rosati (B.M.A.) has been appointed Government Medical Officer at Coonamble, New South Wales.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xviii.

ECHUCA DISTRICT HOSPITAL: Resident Medical Officer.

ROYAL NORTH SHORE HOSPITAL OF SYDNEY: Resident Medical Officer.

TOOWOOMBA HOSPITALS BOARD: Resident Medical Officers.

THE UNIVERSITY OF SYDNEY: Assistant Medical Radio-therapist.

ZEEHAN DISTRICT DISPENSARY AND MEDICAL UNION AND MONTAGU MEDICAL UNION: Junior Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. Marrickville United Friendly Societies' Dispensary. People's Prudential Benefit Society. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Contract Practice Appointments in South Australia. Booleroo Centre Medical Club.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Medical practitioners are requested not to apply for appointments to position at the Hobart General Hospital, Tasmania, without first having communicated with the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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